MAY, 1955

American Engineer

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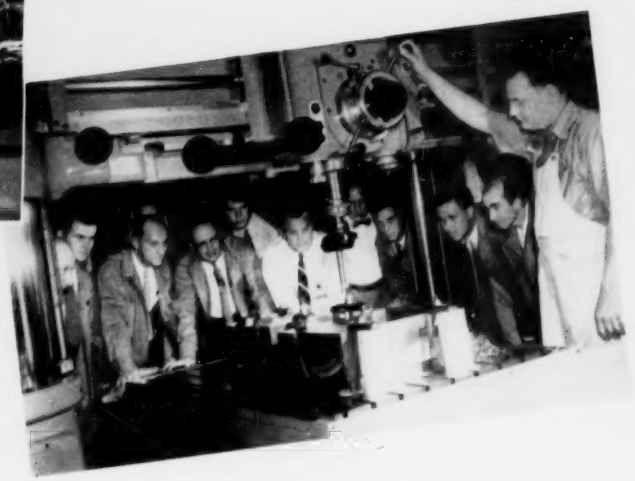
- A Condensation of the New Report

HOW TO TRAIN ENGINEERS IN INDUSTRY

— In a Special Color Center Section Pages 19-25 —



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—ALBERT EINSTEIN

BPA

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Letters to the Editor

The Corporate Problem . . .

► The letter reprinted below was sent by Mr. Frederick H. Zurmuhlen, P. E., Commissioner, Department of Public Works, City of New York, to all members of the Legislature of the State of New York, in comment upon the discussions of that body relative to several bills before them that would allow the practice of engineering in the State by corporations. Incidentally, the Legislature has since adjourned with all bills mentioned below dying in Committee. Mr. Zurmuhlen has asked that the letter be printed in the AE to reveal other aspects of the troublesome corporate practice problem.—*Editor.*

. . . Defeated in their efforts two years in a row, the corporate interests once again are trying to open the floodgates to the practice of professional engineering by corporations in the State of New York. In deciding for or against these bills I think our Legislators will want to know the answers to two questions:

1. Are these bills in the public interest, since the present law regards the practice of professional engineering *by individuals* as essential to safeguarding of life, health and property?

2. Are these bills in the interests of professional engineering, recognized as it is by existing law as one of the learned professions and by that very fact inseparable from individual action and responsibility?

There can be only one answer to these questions: No.

. . . Corporations are fictitious entities, without morality, character or personality. Corporations are motivated by business incentives and governed by the ethics of the market place. Can a corporation be expected to conduct itself and be disciplined in the same manner and as effectively as a living individual, jealous of his good name, reputation and professional standing and dependent on these factors for his livelihood? If professional engineering becomes the province of corporations, can professional engineering as practiced by individuals and partnerships long survive? Are not the interests of professional engineers in this respect inseparable from the public interest? Are we to let professional engineering take its chances in the face of huge corporations engaged in engineering? Are we to pit the individual engineer bound by professional ethics and conduct against the business motivations and incentives which are the *raison d'etre* of corporations?

In short, if engineering is a profession, can its practice be reconciled with invasion of the field by corporations?

THE BILLS PENDING BEFORE THE LEGISLATURE

1. The MILMOE (No. 1936, Int. 1829) and GIACCIO (No. 2460, Int. 2369) BILL is essentially the same as the MILMOE-CARLINO BILL introduced in 1954. The Milmoe-Giaccio Bill—as did the Milmoe-Carlino Bill—would require only that a vice-president and any other person in responsible charge of a corporation's New York engineering activities be licensed professional engineers. As I said last year in respect to the Milmoe-Carlino Bill, if other than licensed professional engineers are to do the actual engineering work, as the proposed bill would permit, there is posed a threat not only to engineering as a profession but also to the public safety and welfare.

2. The COOKE-BROOK BILL—All the objections which apply to the Milmoe-Giaccio Bill (plus some others) apply to it with equal force. The Milmoe-Giaccio Bill at least has in its favor the fact that it does not seek to disguise what it attempts to do. The Cooke-Brook Bill, however, lays down a smoke screen of high-sounding aims and then proceeds to do the exact opposite.

. . . The bill opens the practice of professional engineering and surveying to any corporation so long as it registers and so long as all its directors and officers are licensed professional engineers or land surveyors. In permitting corporate practice of professional engineering the bill equates corporations with living individuals. But the requirement of the bill that all directors and officers be licensed professional engineers is in itself an admission that it is impossible to equate the two. And the attempt to safeguard the public interest by this requirement is based either on ignorance, false hopes or dissimulation.

While the management and direction of corporate business is entrusted to the officers and directors of a corporation, the actual control rests with the stockholders.

Where all or most of the stock (in many cases a minority of the stock may be sufficient) is held by one or a few individuals, policy will be determined by that or those individuals even though they are not the officers or directors—for the directors and officers are elected by the stockholders. The principal shareholder or shareholders, therefore, will select the directors, who in turn choose the officers. These directors and officers then, possibly without a single share in the corporation (the Corporation Law does not make ownership of any shares a necessary qualification for directors or officers) are expected to exercise independent judgment in guiding the affairs of the corporation. Is it reasonable to suppose that they will forget whose creatures they are and act independently of the wishes of those who elected them? Who could withstand the pressures to which this law would subject professional engineers? And even if they could, how long would they remain officers or directors?

It is plain, therefore, that the requirement that all directors and officers of the corporation be licensed professional engineers is advanced either in ignorance of the law or designed to lull the innocent among professional engineers and the public into a false sense of security. (How easy, for example, it would be for corporations in construction work to form subsidiary corporations—wholly owned by them—for the practice of professional engineering!) Opening the gates to corporate practice of professional engineering would destroy the very basis on which the present licensing law is founded—namely that engineering is a learned profession peculiarly in the province of individuals and that the only exception is in the case of corporations engaged in professional engineering before the present law was enacted.

May I repeat a statement I made last year: —"Merely because the corporate form may be more convenient, more advantageous from the point of view of tax savings, more

appealing to certain people who do not have professional engineering qualifications but would like to profit from the labors of professional engineers without assuming their professional liabilities, are no reasons for emasculating the present law."

Patent Law and P. E.'s . . .

Dear Editor:

The attorney at law and the professional engineer enjoy the most cordial relations. Both professions have a major stake in the patent system, yet it is almost unbelievable to observe the lawyer and especially the engineer sitting idly by while their rights, titles and privileges are usurped by the *patent practitioner*. A definition provides a starting point:

"Patent law is the profession concerned with providing legal protection for discoveries and inventions. Its principles are derived from the professions of engineering and the law. The major portion of its practitioners, while being neither engineers nor lawyers, practice some phases of both of these professions."

The Constitution seeks to encourage "the Progress of Science and Useful Arts" which constitute engineering, yet of the 5,000 practitioners before the Patent Office, only 5 per cent are professional engineers. While the patent profession boldly shouts its claims of "integrity" and "honor," the facts show that they have been prosecuted by the American Bar Association in Illinois, Ohio and California for the unlawful practice of the law. The engineer has not yet acted to protect his rights. The engineer and the lawyer should enforce their joint interest in their severe and unfriendly conflict with the patent practitioner.

The patent profession is not ignorant of its violation. The maxim, "Ignorance of the law excuses no man," applies to all and here surely, and the classic misstatement also, with great force, "The patent lawyer must be taken to be cognizant of the law."

It is very important to note that the greatest number of patents are not granted to licensed professional engineers nor to persons who are termed "engineers" in the popular sense. Most patents are granted to laymen and to the lay personnel of research organizations, principally of manufacturing corporations.

The opinions rendered to a lay inventor on the merit and novelty of his invention prior to preparing a patent application surely involve the practice of engineering. The preparation and prosecution of the patent application before the Patent Office involves engineering skills of a high order, detailed engineering descriptions of inventions, complex engineering claims which are difficult to draw with accuracy by either engineers or lawyers, engineering drawing, study of previous work in related engineering fields (prior art), and frequently engineering modifications. Should the professional engineer not regard this as the practice of his profession?

May a patent lawyer (1) render engineering services and (2) represent himself to be an "engineer" when he is not a registered professional engineer without violating (a) the Canons of Professional Ethics of the American Bar Association, (b) the Canons of Ethics of NSPE and (c) the professional engineering registration statutes of the states?

The deepest cut to the professional engineer is in the attitude of the Patent Office. The opinion expressed by one mem-

(*Continued on page 38*)

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PROFESSIONAL NEWS IN CAPSULE FORM

A Roundup of Late Events for Professional Engineers

O'Rourke Heads Railway Engineering Association

G. M. O'Rourke of Chicago, assistant engineer-maintenance of way for the Illinois Central Railroad, has recently been installed as the new president of the American Railway Engineering Association.

William J. Hedley of St. Louis, assistant chief engineer of the Wabash Railroad, was elected senior vice president of the organization, while Ray McBrian of Denver, engineer of standards and research for the Denver and Rio Grande Western Railroad, was named junior vice president.

Cherry Emerson Retiring

Announcement has been made of the impending retirement of Cherry L. Emerson, prominent NSPE member and engineering educator, as vice president of the Georgia Institute of Technology. Mr. Emerson, who first joined the staff of the Institute as dean of engineering in 1945, will complete his term as vice president on June 30.

Illuminating Award to Stair

J. L. Stair, a prominent engineer in the lighting field who was for many years associated with Curtis Lighting, Inc., has been named to receive the 1955 Gold Medal of the Illuminating Engineering Society. The award, which will be presented to Mr. Stair in Cleveland next September during the Society's National Technical Conference, is being given in recognition of his outstanding engineering talent and his lifetime concern with the manufacture and application of lighting equipment.

Mr. Stair retired as chief engineer of Curtis Lighting in 1948 but continued as a consultant making many new contributions. He is a graduate of the University of Illinois and holds many patents in the lighting field.

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New Photogrammetry Officers

W. Sidney Park, president of Park Aerial Surveys, Louisville, Kentucky, has been elected president of the American Society of Photogrammetry. William C. Cude, chief of the Topographic Engineering Department at the Engineering Research & Development Laboratories, Ft. Belvoir, Virginia, was chosen first vice president; and Kenneth E. Reynolds, manager, Defense Contracts Department, Bausch & Lomb Optical Company, Rochester, N. Y., was named second vice president.

Internal Combustion Engine Institute Elects Officers

B. G. Van Zee, chief engineer of the Automotive Engineering Division, Minneapolis-Moline Company of Minneapolis, is the newly elected president of the Internal Combustion Engine Institute, according to a recent report from the organization's executive office in Chicago.

Other new officials of the Institute are: E. Don Tull, Columbus, Indiana, vice president; H. W. Smith, Peoria, Illinois, secretary; and Phil Norton, Milwaukee, treasurer.

Tau Beta Pi Fellows

The Fellowship Board of Tau Beta Pi has recently announced the names of the recipients of graduate fellowships for the coming school year. The students and the schools which they will attend are: Edward M. Austin, Rome, Georgia—Georgia Institute of Technology; William J. Neff, Washington, D. C.—Massachusetts Institute of Technology; George M. Kulynych, Smithmill, Pennsylvania—University of Michigan; Joseph B. Workman, Crestview, Maryland — Massachusetts Institute of Technology; and Keith A. Yarborough, LaGrange, Illinois—University of Illinois.

Mr. Austin's fellowship, while administerd by Tau Beta Pi, is sponsored by the Louis Allis Company, Milwaukee. Mr. Neff's is sponsored by the Minneapolis-Honeywell Regulator Company. Mr. Kulynych is currently

completing work at The Pennsylvania State University and Mr. Workman, at the University of Maryland. The others are studying in the schools where they will also receive the fellowships.

Management Jobs Open

Almost unlimited opportunities for engineers in the field of engineering management were predicted recently by C. J. Bellers, general superintendent of electric operations and engineering for the Cleveland Electric Illuminating Company and a member of NSPE. Mr. Bellers offered this observation in a speech made during the Middle Eastern District meeting of the American Institute of Electrical Engineers at the Deshler-Hilton Hotel in Columbus.

Taking note of the current high demand for engineers, Mr. Bellers stated that "there is a much greater shortage of those rare individuals who are competent engineers, but skilled managers as well."

"With the growing size and complexity of business of an engineering nature," he stated, "the demand will be even greater in the future. It would seem almost evident that capable engineers who have the natural inclination and desire to enter the field of management of engineering organizations will find unusual opportunities, if they are willing to spend the time and effort to qualify themselves properly."

In other addresses delivered during the same meeting, two leading educators stressed the importance of professional consciousness and ethics in the maintenance of the profession's status. C. J. Freund, dean of the College of Engineering, University of Detroit, told the AIEE members he is convinced that "our most urgent task is to take our professional ethics seriously"; while Professor Cornelius Wandmacher, head of the Civil Engineering Department, University of Cincinnati, emphasized the need for stressing professional consciousness not only in the schools of engineering, but also during the first working years of the young graduate.

Fenn College Encourages Engineering Careers

Five hundred fourteen applications from Cleveland area high school seniors to participate in the March 23rd Engineering Career Day sponsored by Fenn College necessitated the immediate planning of a second conference

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to accommodate the students who could not be included in the group of 300 to which the Career Day was restricted. Such was one of the indications of the great success of the annual career conferences organized several years ago by Fenn at the instigation of Vice President H. R. Taylor to interest students in engineering careers.

Under the auspices of the Fenn Engineering School, of which W. A. Patterson is dean, the student guests of the college go "on location" to tour local industrial plants and hear addresses by leading engineers, executives, and educators.

The 1955 Career Day offered tours and conferences in chemical, civil, electrical, metallurgical, and mechanical engineering. Companies who cooperated with Fenn in making the program possible were The Brush Electronics Company, The Austin Company, The Ford Motor Company, and The Standard Oil Company.

Dresser Aids Students At Oklahoma A&M

A fund for the benefit of engineering upperclassmen of Oklahoma A&M College, Stillwater, has been established with a $5,000 gift from L. L. Dresser, president of the Dresser Engineering Co., Tulsa. Complete details for the use of the fund have yet to be worked out, according to E. R. Stapley, dean of A&M's Oklahoma Institute of Technology, who announced its establishment and expressed the school's gratitude to the donor.

Mr. Dresser, who is well known for his work in behalf of the engineering profession, is a past president of NSPE.

Canadian Income Survey

The median annual income for professional engineers throughout Canada was determined to be $6,100 in a recent survey conducted by the Association of Professional Engineers of the Province of Ontario. The upper quartile figure determined by the study was $7,300, while engineers in the upper decile earned at least $10,900. The lower decile figure for all of Canada was determined to be $4,400, while the lower quartile was reported as $5,000.

When the results of the survey were studied province by province, Quebec and Alberta, where the medians were $6,400 and $6,300 respectively, showed the highest earnings for engineers. In both of these provinces, too, upper decile earnings began at $12,000, and the upper quartile figures were $8,600 for Quebec and $8,200 for Alberta.

The Ontario median was the same as the national one—$6,100. Results from Saskatchewan and Manitoba, taken together, gave a $6,000 median. The median salary figure in British Columbia was $5,300, as it was for New Brunswick, Nova Scotia, and Newfoundland, taken as a unit.

In no case was the upper decile figure less than $10,000. The least upper quartile figure reported was $7,200 for the New Brunswick, Nova Scotia, and Newfoundland engineers. The smallest lower decile figure was the $4,200 for British Columbia.

Technical Drawing Teachers Needed for Future Engineers

The training of future engineers is threatened seriously today by a critical shortage of technical drawing teachers, according to a recent statement by Professor Henry C. Spencer, director of the Technical Drawing Department, Illinois Institute of Technology, Chicago.

Calling technical drawing "the language of technology everywhere" and "the foundation of all engineering studies," Professor Spencer pointed out that the supply of qualified engineers and teachers in the field is "nowhere near the demand now, or for the immediate future."

In trade schools, high schools, and colleges the competition for technical drawing teachers is so keen, he stated, that monthly starting salaries are higher than in many other jobs. He said a beginning technical drawing instructor in the average university earns a minimum of $400 per month.

Illinois Tech is the only university in the country that has an undergraduate department granting degrees in technical drawing and a graduate program leading to a master's degree in engineering graphics.

ASME Medalists Named

Howard S. Bean of the National Bureau of Standards was recently awarded the Worcester Reed Warner Medal of the American Society of Mechanical Engineers. The award is bestowed for outstanding contributions to permanent engineering literature. Mr. Bean, who is chief of the Capacity, Density and Fluid Meters Section at the Bureau, is widely known for his extensive work in the field of flow measurement and his many publications on the subject.

The ASME has also announced that its Holley Medal, which is bestowed "for some great and unique act of genius of an engineering nature that has accomplished a great and timely public benefit," has been awarded to George J. Hood, professor emeritus of the University of Kansas School of Engineering. Professor Hood was cited for his invention of the dermatome, a skin-grafting machine, making possible surgical treatment of severe burns and other similarly destructive injuries.

The Society's Distinguished Service Medal has been presented to Granville M. Read, chief engineer of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. He has been cited for "his outstanding leadership in developing men and in organizing and completing projects of extraordinary national and industrial importance."

Standards Engineers Elect

M. S. Gokhale, manager of mechanical standards, and secretary, Standards Policy Committee, RCA Victor Division, Radio Corporation of America, Camden, N. J., has recently been elected president of the Standards Engineers Society. Other new officers of the organization are: Herbert G. Arlt, materials specification engineer, Bell Telephone Laboratories, Murray Hill, N. J.—vice president; C. W. Bowler, Leeds & Northrup Company, Philadelphia—secretary; and Victor S. Gittens, Philco Corporation, Philadelphia—treasurer.

American Engineer

The Magazine of the Registered Professional Engineer

VOLUME TWENTY-FIVE, NUMBER FIVE

Moving Day for Industry

The Responsibilities Of Industry in a New Community Are Discussed

By
Steven P. J. Wood,
President, Warner Electric Brake & Clutch Co.

SLOWLY, but surely, over the past two decades the pattern of American cities has been changing. In general, this pattern has taken a course of outward development from heavily-populated areas. This "flight to the suburbs" has accelerated to such a degree that we are now in an era of expanding urban frontiers. New communities are being founded by the score; old communities are either falling behind or are undergoing a "face lifting" in order to compete with their younger neighbors.

As in the case of the American family, American industry is also on the move. From New York to California and from the Canadian border to Mexico, thousands of industrial firms, both large and small, are deserting traditional "factory areas" and are constructing modern plants in locations where only a short while ago no smokestack had ever appeared.

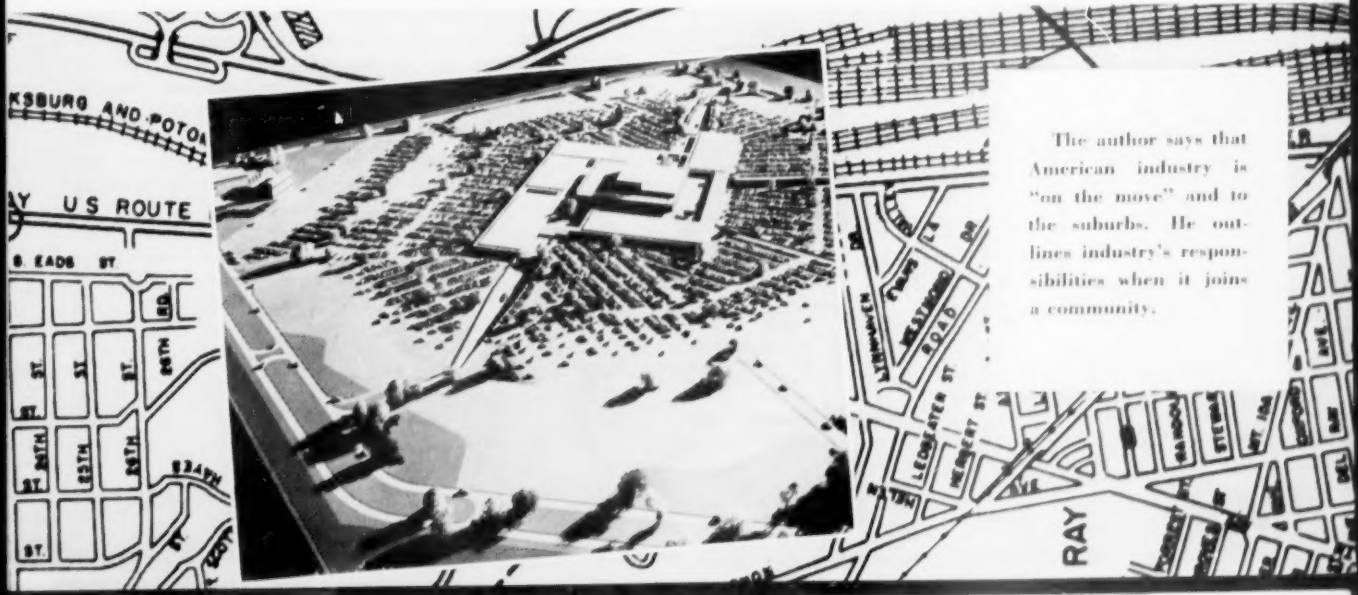
There are two chief reasons for this mass movement of industry to new locations:

First, there is the desire on the part of the industrial worker to achieve home ownership in a pleasant community, rather than in the usual "near slum" area close to older factories.

Second, there is the realization on the part of industry that it must follow its labor market and at the same time be close to such facilities as transportation, good road networks, sources of supply, reasonable tax rates, sufficient public utilities and community living areas. Suburban developments seem to fill most of these requirements.

Recent nationwide surveys have pointed up the fact that this migration of industry to suburban areas offers advantages to both the corporation itself and to the community as well. Let's take a look at some of the advantages on either side.

As far as the corporation itself is concerned, there are many definite reasons why it is better to locate in the



The author says that American industry is "on the move" and to the suburbs. He outlines industry's responsibilities when it joins a community.

The expansion program, now completed, of the Standard Pressed Steel Co. near Philadelphia called for the landscaping of nine acres, left foreground, for recreation.

suburbs. Among these are increased employee morale, minimum shifting of the labor force, ability to take advantage of modern construction methods which are not hampered by antiquated building codes, and definite tax advantages.

On the other hand, the community itself enjoys many benefits from the industrial migration. Among these are increased population, a broadened and lucrative tax base, an increase in the number of commercial (retail) organizations, and home building activity of unprecedented volume.

Just on the basis of the many new areas which have been developed in the short space of time since the end of World War II, it is easy to see that this industrial movement forms the basis for entirely new American cities. In reality, these new communities are turning out to be the "cities of the future." We can also see that since the so-called "city of the future" is primarily a development of American industry, then American industry has certain definite responsibilities for its growth and planning.

About the Author . . .

Mr. Wood

Steven P. J. Wood, president of the Warner Electric Brake & Clutch Company, Beloit, Wisconsin, joined the Warner firm in 1946. Since that time he has served in a variety of executive positions. He was named sales manager in 1947; vice-president in 1950; and he was elected to the firm's presidency in 1953.

Mr. Wood attended Phillip Exeter Academy, Princeton University, and the Illinois Institute of Technology. In 1941 he entered the U. S. Army and served for five years. His service included a tour of duty in the European Theatre, and he was discharged with the rank of major.

He resides in Beloit, Wisconsin, with his wife, and two daughters. He is a member of the Young Presidents' Organization, The Tavern Club of Chicago, and the University Club of Chicago.

NATURALLY, these responsibilities can be discharged right along with the company's normal business activities—in fact, it is necessary that they be considered a standard part of the corporate policies.

As an example of how the community must be tied in with regular "business thinking," we can consider some of the things which face an industry which wishes to locate in a suburban area. At the outset, two types of planning are necessary: engineering planning and community relations planning.

Of the two, the engineering planning is perhaps the more simple. It would include elements such as surveys to determine proper location; determination of the best type of plant building for the job to be done; future possibilities for expansion; transportation facilities; tax rates; utilities available; and potential sources of workers.

Following these initial findings the corporation engineers are then faced with the actual physical move, including relocation of machinery, purchase of new equipment, plant shutdowns in order to accomplish the move, and many of the same type of details which face anyone moving from one location to another.

The other type of planning—community relations—is one which must be carried on concurrently with engineering planning. And this community relations planning is the responsibility of everyone in the corporation. It is not something that can be relegated to the public relations department and forgotten.

To the professional engineer, this community relations planning may seem "out of his line." Far from it. Whether the professional engineer is acting in a management or engineering capacity, he must be a community relations expert. The reason for this is simple: the relations of the corporation with the community can well determine the success of the entire operation.

ACTUALLY, you can consider "community relations" planning as simply an engineering estimate of how your firm is going to fit into the scheme of suburban living. There is no reason why engineers should fail to make this estimate, but many do. They often take the stand that if a creditable job has been done on the engineering planning, their work is ended. In reality it has just begun.

In the course of community relations planning, incidentally, the problems which will be encountered are endless. One thing is certain, however. The problems must be faced squarely and solved before the plant is actually relocated. Afterwards it is too late.

Following is a factual example of what can happen when community relations planning is neglected:

The "X" Corporation relocated in a suburban area adjoining a large midwestern city. The plant was intended primarily for light manufacturing operations. Plant engineers had supervised the designing of a modern, attractive building, near to transportation and very close to a typical suburban residential area.

Necessary permits were obtained from the community; the building was erected. When the time to paint the building was at hand, the purchasing agent of the firm discovered a "real bargain" in paint. Actually, the paint was a bargain. It was of excellent quality and the price was low. Unfortunately, it came in only one color—an ugly shade of green. The paint seemed to be a good chance to save money, so it was bought and used.

Following the painting, people living in homes near the plant began to complain that the structure was a neighborhood eyesore because of its color. These complaints eventually reached corporation executives. They dismissed them with a shrug.

Shortly afterwards, neighborhood residents began com-

This Fairchild Aircraft plant is located in the beautiful Maryland hills near the small city of Hagerstown, shown in the background.

plaining of a smoke nuisance. The smoke came from a different plant a few blocks away in an unincorporated area. However, the smoke complaint coupled with the color complaint were both laid at the "X" Corporation's door. Protestations of innocence by the "X" Corporation were of no avail. In fact, additional complaints began to pile up, some justified, some entirely false. The entire situation grew out of a bad start.

TODAY, that same corporation is still in ill repute in its chosen community. It is a constant target for left-wing criticism about "heartless industry." The corporation is regarded by the town as an intruder, not as a neighbor. Only an aggressive campaign of community relations over a period of years can overcome this situation. And all of it could have been avoided simply by doing some community relations planning at the start.

A competent group of professional engineers in the same situation could have paved the way for the firm's welcome long before the move was made. They would have determined carefully the effect of the plant color upon the local neighborhood so that the most attractive paint could be used. In this way, friends would have been made at the outset.

Prior to the move they would have investigated smoke conditions, use of streets, zoning regulations, etc. Nothing would have been left to chance.

Had the move been conducted in this manner, the community would have welcomed the corporation into its midst. The community would have also furnished the firm with an increasing labor market and enabled its personnel to move about in an "accepted" atmosphere. In the long run, it would have been good business for the firm.

These are the type of details which the professional engineer should think about if his organization plans to move to a new community. It is not only a part of his responsibility to the firm which employs him, but it is the hallmark of his professional ability.

In short, the building of the "city of the future" rests in the lap of industry and the engineering profession.

Working with the communities, industry can build truly great areas of living, with a proper balance between industrial, commercial and residential developments. Together they can lay down a workable blueprint for a new, modern American city, one of which future generations can well be proud.—***End.***

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RANGE—With water and electric power services only, the range is from freezing temperature up to 150° F (dry bulb). With refrigeration, and using Niagara No-Frost Liquid to prevent freezing of sprays, you achieve dew point temperatures as low as minus 30° F. Control of relative humidity from 5% to 95% is obtained at all temperatures in this range. Air capacity is 200, 400 or 600 c.f.m.

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District Engineers in Principal Cities of United States and Canada

Don't Miss This One!

Phila. Meet Features Full-Day Engineer–Industry Conference

A HIGHLIGHT of NSPE's annual meeting in Philadelphia will be a conference on "Professional Development—The Responsibility of Industry and the Engineer."

The full-day conference will be held June 2 at the Bellevue-Stratford Hotel. Attendance is open to all NSPE members attending the annual meeting and to all other interested engineers and industry representatives.

Participating in the discussion sessions, which will begin at 9 a.m. and continue to approximately 4:30 p.m., will be a distinguished group of engineers, executives, and engineering educators.

The featured speaker at the affair will be Rep. Carroll D. Kearns of Pennsylvania, a member of the House Committee on Education and Labor. Rep. Kearns, who is the sponsor of a pending House bill concerning freedom of association for professional employees, will speak on the "Privilege of a Profession." He has had a considerable part in Congressional examination of problems relating to professional employment under existing Federal labor legislation.

During the morning sessions the conferees will hear talks by five leading industrial engineering figures. At the afternoon session a panel will receive written questions and comments from the audience.

Part of the panel discussion will be utilized for questions raised by the recently published study, "A Professional Look at the Engineer in Industry." This study was prepared by the Engineer-in-Industry Committee of NSPE, under the chairmanship of Robert A. Blackburn, an engineering executive for the Koppers Company.

Purpose of the conference, according to NSPE President Clarence T. Shoch, is to "provide an opportunity for professional engineers and industry representatives to confer on their relations, the difficulties which are encountered by both in meeting those problems, and the opportunities and programs which are or may be used to further the cooperative improvements which are now being sought."

Committee Chairman Blackburn pointed out that most of the engineers in this country are employed by industry and thus their future professional development and growth is directly related to an expanding and prosperous industrial climate. "Without a loyal and proficient engineering staff, American industry cannot go forward," Mr. Blackburn said.

Engineer-in-Industry Committee members emphasized that they organized the conference as part of the National Society's intensified efforts to develop a sympathetic and cooperative program which will lead to ever-improving standards and status for both essential elements—professional engineering and industrial progress.

Mr. Blackburn, explaining that the conference had been scheduled during the Society's annual meeting so that a large number of members could attend, called the affair "a sincere and well planned project to bring professional engineers and industry spokesmen together on vital mutual problems."

The moderator for the morning session will be Dr. James Creese, president of the Drexel Institute of Technology in Philadelphia. The first speaker will be D. S. Roberts, engineer, engineering administrative services, General Electric Company. He will talk on "The Develop-

Principals in Engineer-in-Industry Discussions

D. S. Roberts, Gen. Electric

Dr. James Creese, Drexel Institute

Carl A. Frische, Sperry Co.

E. L. Yates, General Motors

ment and Utilization of Engineers in Industry.

At 10 a.m. the conferees will hear Carl A. Frische, vice president for operations at the Sperry Gyroscope Company, talk on "Industry's Responsibilities to its Engineers." He will be followed by E. L. Yates who will speak on "The Nation's Need for Engineer-Industry Cooperation." Mr. Yates is director of college and university relations, General Motors Corporation.

Scheduled for 11 a.m. is a talk by Gerry E. Morse, vice president industrial relations, Minneapolis-Honeywell Regulator Company. His topic will be "The Engineers' Responsibilities to Industry."

The final speaker before the noon luncheon will be N. W. Dougherty, dean of engineering at the University of Tennessee, and president of the American Society of Engineering Education. Dean Dougherty will speak on "The Role of Engineering Education in Engineer-Industry Cooperation."

Luncheon chairman for the conference is Louis F. Frazza, NSPE vice president, Northeastern area. Congressman Kearns, who represents the 24th District of Pennsylvania, will speak at the luncheon.

A panel discussion beginning at 2 p.m. will be moderated by John D. Coleman, chairman of the Professional Engineers Conference Board for Industry, and a past president of NSPE.

Mr. Blackburn, Dr. G. Brooks Earnest, president, Fenn College and chairman, EJC Committee on Employment Conditions, and the speakers at the morning session, will make up the participants on the panel. The panel will answer and discuss questions received in writing. The questions may be based on the talks given at the morning session or on any other pertinent matters relating to professional engineers in industry.

Dr. G. Brooks Earnest, Pres., Fenn College

Gerry E. Morse Minneapolis-Honeywell

Those attending the conference will be invited to attend subsequent sessions of the NSPE annual meeting which will continue through June 4 at the Bellevue-Stratford Hotel. (See story which follows.)

Information on advance registration for the conference may be obtained from the NSPE headquarters office in Washington. Registration can be made June 2 at the annual meeting registration desk at the hotel.

Copies of a complete transcript of the proceedings of the conference will be made available shortly after the conclusion of the annual meeting.

Serving with Chairman Blackburn on the NSPE Engineer-in-Industry Committee are: T. E. Casselman, Jr., Waban, Mass.; E. H. Wickland, Pitman, N. J.; W. E. Ault, Youngstown, Ohio; L. J. Larson, Milwaukee, Wisc.; D. F. Langenwalter, Altamont, N. Y.; and George Steven, Kenmore, N. Y.

Philadelphia Hosts Annual Meeting June 2-4; Work, Play On Program

By

STANLEY PAIST, P.E., CHAIRMAN,

Publicity Committee, NSPE Annual Meeting

PLAN to be in Philadelphia on June 2, 3 and 4 to participate in the 1955 NSPE Annual Meeting. Don't let this affair depend on the attendance of National and State officers. Be there yourself, and don't worry that this NSPE confab won't be fun for the distaff side of your household. Your wife has had some unusual events planned for her, and you will enjoy the program knowing that both of you are having a fine, relaxing time.

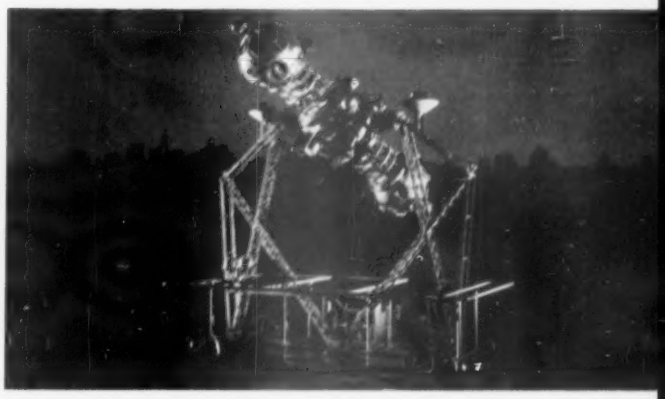
Take a look at the things Billy Penn's descendants have done at the confluence of the Delaware and Schuylkill Rivers since Billy met with the Delawares at Treaty Oak!

Relive the Revolution

Make a spring visit to your country's oldest historical shrines including Independence Hall, Valley Forge Park and the birthplace of the first American flag.

Relive those early revolutionary times in Christ Church. The present building, dating from 1727, is one

Guess Who?



Prehistoric monster? No, a night photo at the Fels Planetarium, Franklin Institute, Philadelphia.

of the most charming examples of Colonial Georgian architecture still standing. Within you will see where George and Martha Washington worshipped along with other famous patriots who formed the bulwark of our Union.

You'll want to visit historic Germantown houses which figured prominently in the Revolutionary War. Inspect Congress Hall; it was built in 1789, and occupied by the Federal Congress while Philadelphia was the Nation's capital. Nearby is Carpenter's Hall, built for one of the earliest trade guilds in the country. Used by the First Continental Congress, the chambers rang with the stirring voice of Patrick Henry as he roused the delegates to rally behind the cause of independence.

OTHER distinctive historical sites are the Walnut Street Theater, the oldest theater building still standing in America; the Holy Trinity Church, the last edifice in colonial red and black brick; the American Philosophical Society, founded by Franklin "for the promoting of useful knowledge"; St. Peter's Church; Old Swedes Church; and authentic and original colonial mansions in Fairmount Park. Also nearby is famous Bucks County, colorful Pennsylvania Dutch country, colonial Trenton, and historical Gettysburg.

Yes, there's plenty to do and see. So come to Philadelphia, see the Liberty Bell, walk down Elfreth's Alley and thoroughly enjoy the best spring vacation you've ever had.

Delaware Valley Marches On

Ever since the end of the War, Philadelphia has been on a construction binge. Philadelphians say they are having a "renaissance" and quite a case can be made for this terminology. There is at least $175 million worth of construction within the city at present and this figure would be trebled if the great industrial basin of the Delaware Valley were included.

The undertakings are as inclusive as the projects are expensive. If you fly in to the meeting, you'll land at the new $15 million terminal building at Philadelphia International Airport. On the planned boat trip up the Delaware, you and your wife will be able to see the fabulous new Fairless Steel Works, the huge Philadelphia Navy Yard, the New York Shipbuilding Yards and the piers of one of the greatest ports in the United States. Your trip will be all the more pleasant for having this vast industrial panorama relieved by the beautiful spring green of the rolling farmland of southeastern Pennsylvania.

If you come to the meeting from below the Mason-Dixon Line, stop in at the Conowingo Dam on the Susquehanna River. Conowingo is the hydro-electric plant in the Philadelphia Electric Company's huge system. The most modern coal burning central stations of this utility are Cromby and Southwark. Both may be visited although they are not on official inspection trip schedules.

Inside the city proper things are popping, too. Right next to City Hall the old Broad Street Station and its Chinese Wall are being replaced by the $50 million Penn Center. Just a few blocks away one huge oversize square of buildings facing Independence Hall has been wiped

In Old Philadelphia . . .

Live it up in beautiful old Philadelphia in June! Come to the Annual Meeting and tie-in a long-to-be-remembered vacation with the top professional engineering meeting of the year. These photos show, beginning at the upper right, the grand Old Liberty Bell; the famous Philadelphia Museum of Art; the Valley Forge Memorial Arch; the new ultramodern one-million dollar Lion House at the zoo; and the statue of Anthony Wayne at Valley Forge.

out to make room for the multimillion dollar Independence Hall Mall.

Cultural Center—Par Excellence

Your Society could not have chosen a more opportune time than June in Philadelphia. The serene beauty of spring is abundantly evident in Fairmount Park, the largest park in the world within the limits of a city. The John Bartram Gardens are well worth visiting and are close to the center of the city. Longwood, the Versailles of the United States, has been selected by the Convention Committee for a special trip. You will find that spring has given the formal gardens breathtaking beauty. The extensive greenhouses and formal inside (yes, *inside*) gardens of this great estate of the DuPont family are exquisite. You will most certainly look back with fond memories on your trip to this world famous spot.

THE Benjamin Franklin Parkway not only links Fairmount Park and its East and West River Drives with the heart of the city but is lined with splendid buildings housing renowned collections of art, educational and cultural achievements. Beyond the pylons, erected in honor of Army and Navy Civil War dead, is the Academy of Natural Sciences, originated in 1812 and the oldest institution of its kind in the U. S. The famous Benjamin Franklin Institute, heralded for its wonders of applied sciences and home of the Fels Planetarium is just beyond. The Free Library contains a fascinating collection of rare books and first editions.

On down the Parkway is the Rodin Museum which includes many originals and more than 200 recasts of sculptures by Auguste Rodin. Dominating the end of the beautiful Parkway is a majestic Greek structure, copied from the Parthenon, which houses the famous collections of the Philadelphia Museum of Art. By all means, visit the sights along the spacious Parkway.

Pictured is Cameron Ralston, internationally famous lecturer, who will appear at the forthcoming Annual Meeting to be held in Philadelphia, June 2-4.

We Need Your Support!

WE can be proud today of our membership in NSPE. During these momentous times, never has the need been greater for a unified force, such as our Society, to integrate technical proficiency into the social side of our way of life. Never has the opportunity been riper for a better understanding of the engineer's position on the American scene.

You—yes, you and your fellow engineers—are the most important ingredient in our crusade. The money you pay in dues to the Society helps, of course, but it is no substitute for your personal loyalty. You are needed at the Annual Meeting in Philadelphia in June. Come; establish the solidarity of purpose so urgently needed in our Society.—*End.*

(Firms Who Will Exhibit At the Meeting Are Listed on Page 38)

Professional Program
for
1955 NSPE Annual Meeting
Bellevue-Stratford Hotel, Philadelphia

Wednesday, June 1
- 9:00 a.m.—NSPE Executive Committee Meeting
- 2:00 p.m.—NSPE Executive Committee Meeting

Thursday, June 2
- 9:00 a.m.—Conference — "Professional Development —The Responsibility of Industry and the Engineer"
- 12:30 p.m.—Luncheon. Congressman Carroll Kearns, speaker
- 2:00 p.m.—Conference — Afternoon Session — Panel Discussion
- 4:00 p.m.—Conference Adjournment
- 4:30 p:m.—NSPE Board of Directors' Meeting, adjourning at 6:30
- 7:30 p.m.—Mixer Party for Members and their Guests with buffet supper

Friday, June 3
- 9:00 a.m.—PSPE Executive Board Meeting
- 9:00 a.m.—NSPE Professional Meeting
- 9:00 a.m.—NSPE Ladies' Auxiliary Advisory Committee Meeting
- 1:00 p.m.—Delaware River Chartered Boat Excursion for all NSPE and PSPE Members and their Guests, with catered luncheon

Saturday, June 4
- 9:00 a.m.—PSPE Annual Meeting
- 9:00 a.m.—NSPE Professional Meeting
- 12:00 p.m.—NSPE and PSPE Luncheon, with Registration Board as Guests
  Award To Walter E. Witte, P.E.
  Membership Committee Awards
- 2:00 p.m.—NSPE Professional Meeting
- 2:00 p.m.—PSPE Newly Elected Board Meeting
- 4:00 p.m.—NSPE Annual Meeting
- 7:00 p.m.—NSPE and PSPE Annual Banquet. NSPE's Outstanding Engineer Award Presented to Dean A. A. Potter.
  Cameron Ralston, Guest Speaker
  Dancing

Entertainment Program

Thursday, June 2
- 10:30 a.m.—Ladies Trip to Longwood Gardens, with Luncheon served at Longwood Gardens
  Return to Hotel at 5 p.m.
- 7:30 p.m.—Pennsylvania Dutch Supper and Entertainment

Friday, June 3
- 11:00 a.m.—Ladies leave for Tour of Historic Philadelphia (Joining men on the boat at Chestnut St. Pier)
- 1:00 p.m.—Delaware River Boat Excursion, with catered luncheon (Buses leave hotel to take men to Chestnut St. Pier at 12:15 p.m.)
- 6:00 p.m.—Open Evening for All Delegates, Members & Guests (List of suggested eating places and places of entertainment to be provided)

Saturday, June 4
- 12:00 p.m.—Luncheon and Specialty Fashion Show at Gimbel's.
- 7:00 p.m.—NSPE and PSPE Annual Banquet. (See above).

A+ for ACHIEVEMENT

Do Outstanding Engineering Students Keep on Going Places After They Leave College?

How Do They Prove the Professors Were Correct in Giving Them Top Scholastic Ratings?

THE AMERICAN ENGINEER has asked a number of leading engineer-educators to tell us about outstanding students they have taught whose success since graduation has justified their early confidence. Of course, no professor could choose just one and only one of his former students as THE outstanding one, but selecting a representative student from among the many who were tops was possible. Now we are spotlighting these outstanding professional men in a new AE series.

The first "A-Plus" for Achievement, awarded by Dr. N. W. Dougherty, P.E., Dean of Engineering, University of Tennessee, goes to:

Charles S. Whitney, P.E.

Milwaukee, Wisconsin

Dr. Dougherty Comments:

"When I was an instructor at Cornell some forty years ago, a student in one of my classes gave unusual promise of engineering success. We were doing some experiments in the materials' testing laboratory and one of the experiments was to measure the intensity of the earth's field. A fellow professor had prepared some mimeographed notes as instructions. Charles S. Whitney was only a sophomore at that time, but he ran through the instructions and came up with an error in one of the equations. We took it to the professor and he changed the notes accordingly.

"In his senior year, as was the custom of the Society of Sigma Xi, Whitney was recommended for membership in that Society. I recall very well the discussion regarding other members of his class. A number of other students had outstanding records and were eligible for election, but I always remember a statement of one young member of the faculty who said that Whitney was 'in a class by himself.'

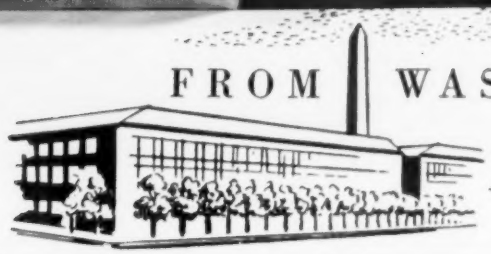
"I did not teach Whitney as a graduate student, but during his graduate work he attracted the attention of the faculty and other engineers by his analysis of the reinforced concrete arch. His method was finally published as the Whitney Analysis of Concrete Arches.

Dr. Dougherty

"After leaving the university, he entered the field of structural engineering and assisted with the design of the approaches to the Hell Gate Arch. Over the years, he has made many original contributions to the field of structural engineering. At the present time, he is a partner in the firm of Ammann & Whitney, consulting engineers of New York and Milwaukee.

"He is also a member of the National Society of Professional Engineers, the Wisconsin SPE, and other professional and technical organizations; and his most recent 'A-plus' in Achievement has been received with his election as president of the American Concrete Institute for 1955 during the group's 51st annual convention."

(First of a Series)



FROM WASHINGTON

By
Milton F. Lunch,
N.S.P.E.'s Legislative Analyst

THE CASE OF THE 50,000 RUSSIANS

A member of Congress remarked recently that hardly a paper crosses his desk that does not mention the shortage of engineers in the United States. While this is no doubt an exaggeration of the congressional attention being put on the supply and demand of engineers, it is indicative that the "shortage question" is no longer an intra-professional matter—it is definitely receiving priority consideration in the halls of Congress.

Some members of Congress have inserted articles on the shortage situation in the "Congressional Record," a number have referred to the shortage in floor debate and the shortage has been offered as a basis by those members of Congress who have filed legislation to establish government financial aid to encourage the study of engineering and science by more young people.

Almost invariably the articles, speeches and analyses of the "shortage" and the threat it is said to present to the future defense of the United States refer to the statement that Russia is training 50,000 engineers per year and the United States is turning out less than half that number at the current rate. Whether or not there is really a "shortage" is a matter of some disagreement, and if there is, how to cure it, of even more disagreement. Also, whether the number of engineers trained each year in Russia is properly related to the needs of the United States is a matter upon which there is not unanimity of opinion.

◄ Rep. Sidney R. Yates of Illinois

Rep. Albert Thomas of Texas ►

What is of some significance in this picture is the emergence of official Congressional interest, with some influential members raising challenging questions about the claim of 50,000 Russian engineers per year. Earlier this year a sub-committee of the House Committee on Appropriations heard testimony from federal agencies in the scientific field. Dr. Alan T. Waterman, Director of the National Science Foundation told the subcommittee members, ". . . there is every reason to believe that the U.S.S.R. has already surpassed us in the production of engineers . . ." Subcommittee Chairman Albert Thomas of Texas commented, "I notice that you, 2 or 3 times, refer to that throughout your justification (for the requested appropriation). How much is fact and how much is fiction? How did you arrive at that statement?" Dr. Waterman explained the various sources used as a basis for the estimate of the numbers of engineers trained in Russia, including published statements by Russian officials, Russian publications and reports from travelers. Chairman Thomas replied: "What are their public utterances in the field of information which makes it any different in relation to this activity? We have had a lot of experience with them in their other statements. We find that that is just not worth the paper it is written on. How do you reconcile your statement that they are ahead of us in this field or that field, when no one knows the truth of it?"

With reference to information brought back from Russia by U. S. visitors, Thomas commented: "What is the basis of his information? People travel from this country into that country, but the bridle is put on them when they get there. They are shown the things they want them to see. I do not see how you can put too much credence in any of their propaganda." Another member of the subcommittee—Representative Sidney R. Yates of Illinois—pressed the NSF witnesses for a more authentic

(Please turn the page)

(Continued from previous page)

basis on the number of Russian-trained engineers, commenting after an exchange on the ways in which the estimates are reached: "As a lawyer, the question still remains in my mind as to whether or not you are repeating hearsay. Are you repeating what somebody has told you rather than having some underlying evidence of the advancement? Have you seen tangible evidence of it? Have these physicists that you referred to seen tangible evidence of this? We have seen the statements that the chairman has alluded to. We wonder as to the accuracy. There is a dearth of information coming out of Russia. How do you know this is so?

Thus it went with the NSF witnesses and the same theme was struck again when the witnesses for the National Advisory Committee for Aeronautics took the stand. A further challenge along similar lines was stated on the floor of the House during debate on an appropriation bill by Representative Victor Wickersham of Oklahoma, who recently returned from an overseas tour which included several weeks in Russia. He referred to the training of engineers and scientists in Russia and China in large numbers and said: "The metropolitan press and various trade journals have reflected the growing alarm of the free world because of this situation . . . production experts throughout the United States have called attention to the assembly-line method of graduating trained technicians from the schools of higher learning in the chief Communist countries.

"It is high time that this situation be subjected to critical examination in the House of Representatives."

After reviewing the statistics and production aspects of Russia's technical operations, Rep. Wickersham said, ". . . we can immediately discount heavily their claims of their overwhelming superiority in numbers of trained technicians. We must realize that the Red Russia-Red China supply of this vital commodity does not necessarily mean experienced trained technicians. Educated people often fail under the stress of practical demands. We have educated people who have succeeded in the face of practical demands . . . I do not fear the sudden surge of an output of technicians from Soviet institutions of higher learning."

The point of this review of Congressional interest is not whether there is an actual shortage or a theoretical one, but to illustrate that the "shortage question" is receiving critical Congressional attention and that before any Federal action is taken, based on the shortage as related to the Russian output of engineers, there will be some insistence for more proof than has been offered heretofore.

FOURTH HOME FOR POINT FOUR

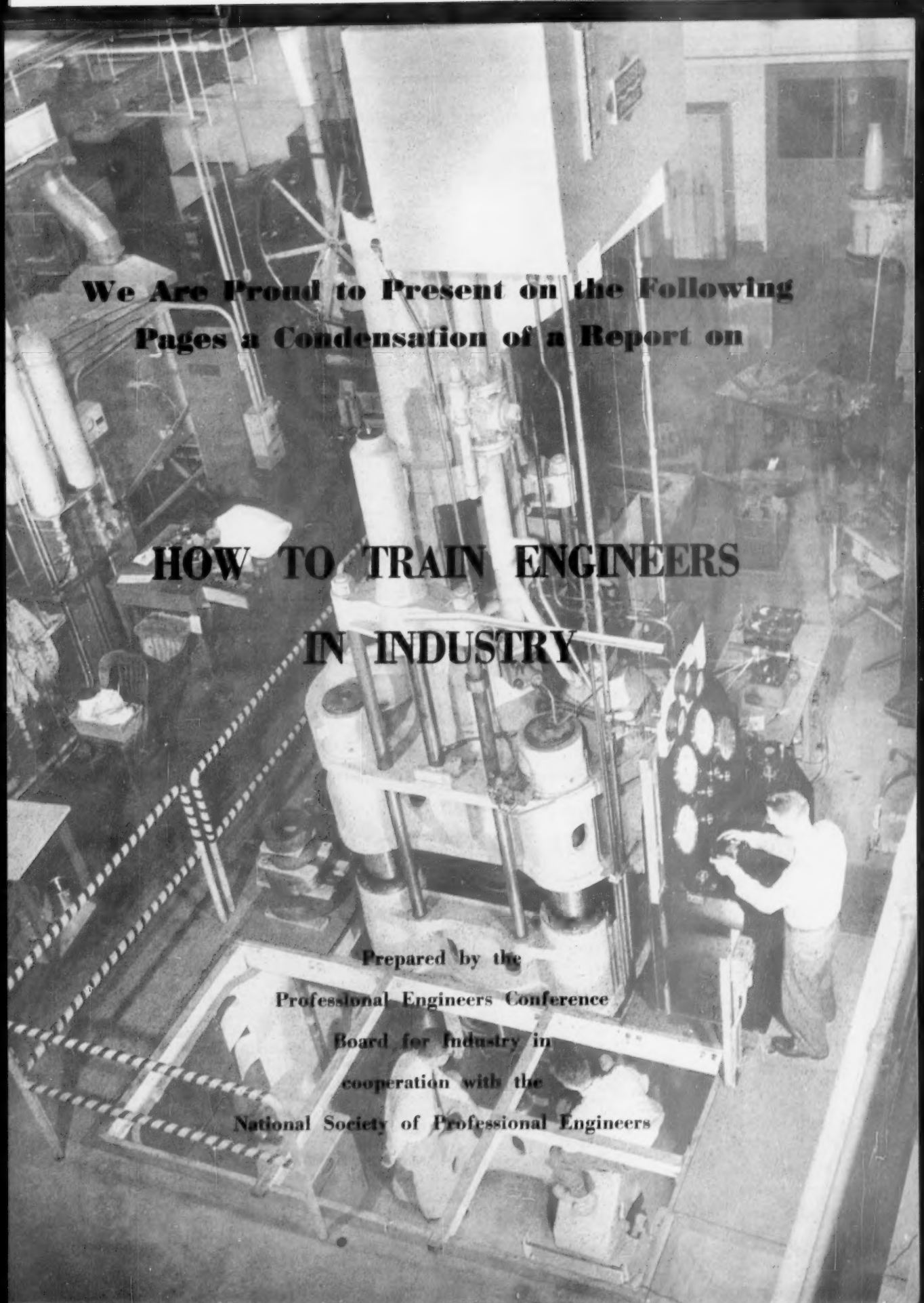
Since former President Truman's inaugural address in 1949 which enunciated as a fourth point in his plans a "bold new program" of technical assistance to underdeveloped countries, the so-called Point Four Program has had three administrative homes. Now, President Eisenhower is preparing to place it in a fourth home by establishing a semi-autonomous agency in the State Department, to be known as the International Cooperation Administration.

Former President Harry Truman

The technical assistance program is now in the Federal Operations Administration, scheduled to expire on June 30, under the direction of Harold E. Stassen who has been appointed a special assistant to President Eisenhower on disarmament. A staff report of the Senate Foreign Relations subcommittee recently said that the Point Four Program is and will be a problem child until its purpose and scope are fixed. The National Planning Association also recently criticized the shifting administration of the program, claiming that the constant reorganizations had had a demoralizing effect.

President Eisenhower has put in a strong bid for support of the technical assistance operations and has asked Congress to appropriate $172,000,000 for the next fiscal year, which, if granted, will be $55,500,000 more than appropriated last year and substantially above the highest amount ever allowed during the life of the program. He also asked for stronger financial support of the United Nations technical assistance work "in a continuing and adequate manner." Congress has appropriated $6,500,000 for the current fiscal year as the U. S. contribution to the U.N. program, compared to the $8 million the President had requested.

Although the President's over-all foreign economic aid program appears to be in for some trouble at the Capitol, there is stronger support for continuation of the technical assistance work. Senator Harry F. Byrd of Virginia, chairman of the powerful Senate Finance Committee, and a noted advocate of economy, announced that he will try to eliminate all economic aid to foreign countries, "except for a reasonable amount of 'Point Four' technical assistance to underdeveloped countries."



We Are Proud to Present on the Following Pages a Condensation of a Report on

HOW TO TRAIN ENGINEERS IN INDUSTRY

Prepared by the

Professional Engineers Conference

Board for Industry in

cooperation with the

National Society of Professional Engineers

A Message About the Report by the PECBI

Mr. Coleman

"How to Train Engineers in Industry" is the fourth in the current series of executive research surveys sponsored by the Professional Engineers Conference Board for Industry, in cooperation with NSPE. The completed report, now published in book form, is the result of a nation-wide survey of over 200 industrial firms. The purpose which guided the Conference Board in preparing this study was that of providing practical and helpful information to industry concerning the vital engineer-management problem of training graduate professional engineers in industry. This same purpose can be seen in the Board's three previous reports, each of which had a wide distribution throughout industry. These reports are: "How to Improve Engineering-Management Communications"; "How to Improve the Utilization of Engineering Manpower"; and "How to Attract and Hold Engineering Talent." The members of the Conference Board feel that the four research projects undertaken so far have well justified the principles set forth in the Board's articles of incorporation as a non-profit, educational and research group. Since the publication of the first report in March, 1952, the work of the Conference Board has become increasingly recognized in the engineer-management field. Starting out as an adjunct of the NSPE, the Conference Board is now a legally independent organization. In 1954 a ruling was received from the Internal Revenue Office which gave the Board a tax-deductible status. This means that the Board has a legal standing similar to the tax exempt foundations that are devoted exclusively to educational and scientific pursuits. With the publication of the fourth report, the Board has reached the end of the first phase of its research program. In shaping the plans and specifications for its next phase of operations the Board has become cognizant of the fact there is a definite need for an industry-wide research program set up on a permanent basis and equipped to deal with the complex problems that our ever growing technology has brought about. The contribution of the professional engineer to industry today is an enormous one. It will become even greater in the near future. But with importance comes responsibility—responsibility on the part of the professional engineer to lend a hand in the solution of certain industrial problems. We on the Conference Board sincerely hope that the executive research survey reports published to date have been in the direction of helping management and engineers to solve their mutual problems in a manner which will strengthen both the industrial and the professional fabric of our American system.

John D. Coleman, P. E.,
Chairman,
Professional Engineers Conference
Board for Industry

A Condensation of the New Report

How to Train Engineers in Industry

In an era of increasing dependence upon the machine—an era of robot factory operations, electronic "brains," and push-button offices—American industry, paradoxically, is paying more and more attention to the human individual and his problems on and away from the job.

New training programs are being developed, and old ones expanded, reorganized, and modified, not only for the worker on the assembly line, to help him adjust to new production techniques, but also, and most particularly, for the engineer.

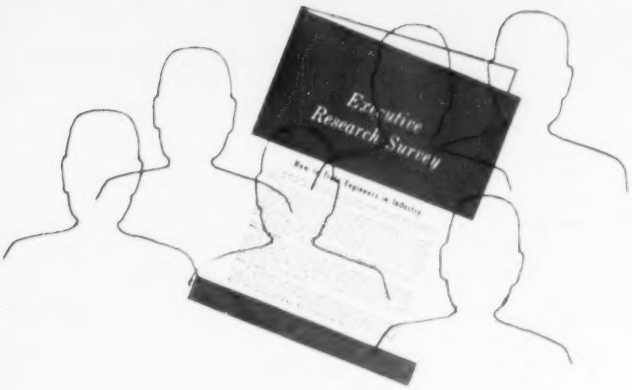
To learn about the problems faced by industry in offering advanced training to graduate engineers the Conference Board surveyed more than 200 companies employing a total of approximately 1,531,254 persons. Top executives in each firm received detailed questionnaires on their engineer training program. In addition to the questionnaire, researchers visited a selected group of firms and interviewed executives, training supervisors, and engineers themselves.

Slightly more than 50 per cent of the replies received were from firms engaged in manufacturing. Others were from public utilities, government agencies, and research organizations. The companies ranged in size from a small six-man consulting engineer's office to a mammoth firm with a personnel roster of more than 230,000 persons.

One of the most striking aspects of the training picture today is the apparent lack of any uniformity in training methods or in the scope of training programs, not only among different industries and engineering fields but among different companies within the same industry or engineering field.

Many and varied techniques are being employed—multiple management, role playing, job rotation, human relations conferences, formal study courses, psychodrama, and guided experience, to name just a few.

Because the Conference Board granted them complete anonymity where they desired it, those who responded to the questionnaire offered complete and frank replies, even to the point of admitting deficiencies and misdirection in their own programs.



WHAT PRICE TRAINING?

Fifty per cent of the plants surveyed have training programs for engineers. The figure is 85 per cent for firms employing over 100 engineers. The cost ranges from nothing to several million dollars annually. The general manager of a small tool company summed up a widely held view in that: "A training program can be just as expensive as you want to make it."

Companies that can afford it are turning more and more to the payment of tuition fees for engineers taking graduate work in local colleges or universities.

TYPICAL TRAINING PROGRAMS

Ninety-two per cent of the firms surveyed found that a program of orientation and indoctrination for newly employed engineers was essential. Thirty-one per cent of the large firms permit engineers to take courses on company time. Forty-four per cent of the large firms have formal management training programs.

Three basic types of training are indicated by the survey:

1. Indoctrination
2. Professional growth
3. Management development

Training "philosophy" appears to fall into three categories:

1. The "specialized groups" approach. Engineers move from one department to another in a carefully planned program. They are exposed to the operation of all phases of the firm's activity. Each engineer is closely watched and must show definite evidence of progress.
2. The "on their own" approach. The engineer is left on his own to absorb knowledge about the firm's operations.
3. The middle course. A mixture of on-the-job training and tuition-paid courses.

The importance of registration as a stimulant to professional growth was recognized by 36 per cent of the reporting companies, which grant time off for refresher courses.

Significantly, of the employers who answered key question 6 on the questionnaire—Have you found your rate of turnover among engineering employees, in relation to that for non-engineers, to be (a) higher, (b) lower, or (c) about the same?—the 12 per cent whose answers fell in category (a) were, in the main, firms with fragmentary training programs, or no training programs at all.

TRAINING THE TRAINERS

Line supervisors play the biggest role in company training routines. Special courses and conferences for supervisors are increasingly necessary. The survey finds conflicting opinions on the general subject of labor relations and employee morale with regard to the role of the line supervisor.

More and more, industry is learning that it must also train its supervisors in the techniques of training and then maintain a continuing supervision over them to insure the effectiveness of the program.

This function, with increasing frequency, is being carried on by separate training departments in small plants as well as large. Forty-five per cent of the employers who maintain engineer training programs of any sort reported that their programs are administered by separate departments or training sections of personnel departments. Even among the small plants, 30 per cent said their organizations included at least a training director, and some reported relatively large and active training departments.

Most of the companies with supervisory development programs leaned more heavily on formal "human relations" training, though some employers indicated that they were inclined to doubt the effectiveness of such courses.

ORIENTATION AND INDOCTRINATION

Sixty-one per cent of the executives who responded to the questionnaire have training programs for young graduate engineers. Of these, 90 per cent give such training to the newly graduated engineers entirely on company time.

The formal programs include classroom work, lectures, group discussions, and conferences with key executives.

One major petroleum company has an engineer training program extending over a period of 52 weeks. At the end of the period the engineer trainee is required to submit a final report covering the following topics:

1. A 2,500 word outline history of the oil industry in the U. S.
2. A brief history of the oil fields to which he was assigned.
3. An over-all summary of the work he performed during the training period.
4. An abstract by chapters of a specified book on technical writing.
5. Brief answers to all of the questions in a 51-page questionnaire designed to reveal, in exact detail, how much he has learned about the oil business—both theoretically and practically.

A large public utilities firm in the East has a two-year engineer training program in which the trainee comes up for re-appraisal every six months before a panel of executives representing engineering and other departments.

The importance of financial incentives was also recognized by a large majority of the companies participating in the survey, although the number of firms which grant no pay increase during the training period (30 per cent) seemed quite high. About half the companies said they start all engineer trainees at the same salary. Of the 70 per cent which grant increases during the training period, 67 per cent said they gave pay raises to their trainees as fast as they were earned, while the others preferred a system of automatic increases at stated intervals.

Not all firms, however, agree as to the value of the formalized training program. A large helicopter firm reported that it is abandoning its formal training program because it "just did not work."

But one fact emerged from the survey with great clarity: that small companies need orientation training as much

as do large ones. In some cases, the need is greater. And despite the growing emphasis on training in industry, it is apparent that there is still much work to be done in that area with regard to the small firm. No matter how informal the program may be, it should be based on a definite plan—and there should be provision for a definite follow-through.

RATING AND EVALUATION

Nearly all the participants in the survey who have training programs also have some means of rating and evaluating the performances of the trainees. Fifty-two per cent of the employers said they depended mainly on a composite of the ratings assigned by the supervisors; thirty per cent based their judgments on personal contacts with the trainees; and ten per cent rated trainees by written examinations.

Rating cards currently in use range all the way from a single mimeographed sheet, covering only a few broad characteristics, such as output, knowledge of job, responsibility and cooperation, to elaborately printed, multi-page forms which cover dozens of performance and character trait evaluations. The usefulness of such a system appears to be entirely dependent upon the observation and good judgment of the supervisor.

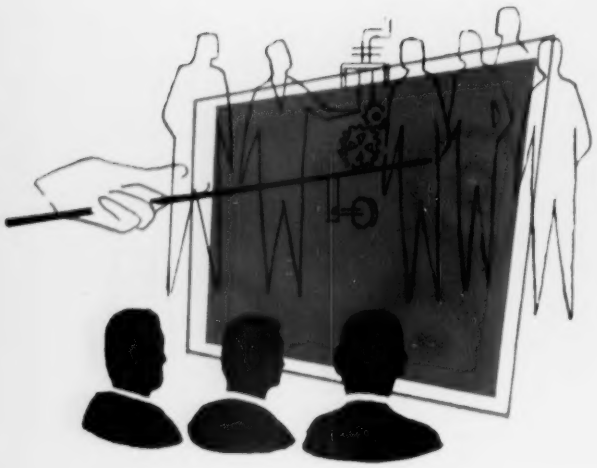
Evaluating the over-all training program sometimes poses greater difficulties than evaluating the performance of an individual, for training people, as a group, all too often exhibit a profound incapacity for honest self-appraisal. In only a few of the many plants visited by survey researchers was there the slightest indication on the part of the training people that their programs could be improved.

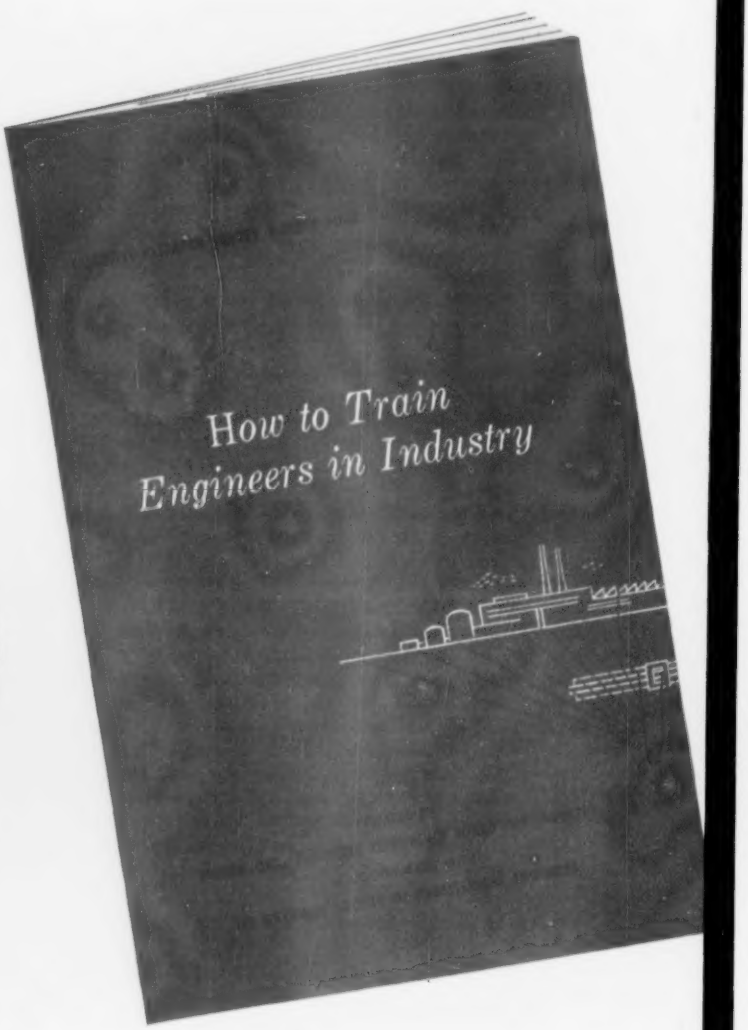
Follow-up on the recent graduate of a training program seems to be one of the most neglected areas in the training picture.

A strong indication of a training program's worth may be the rate of turnover among those who have graduated from it. One Pennsylvania firm reported that about 70

Does your Firm Really Tra

● Here is the fourth in a series of valuable studies designed to aid in the improvement of relations between management and its engineer employees, and to increase the efficiency of engineer utilization in industry. This report is the result of an extensive research project involving over 200 industrial employers of professional engineers.





per cent of its trainees leave the company before the end of their tenth year of employment, with 50 per cent leaving within the first five years.

Companies with effective training programs and superior policies with respect to professional personnel say their turnover rate among engineers is almost nil.

TRAINING FOR A BETTER JOB

Industry's rapid development is making engineer training at the graduate level an increasing necessity. The 208 firms surveyed listed a total of 14,925 engineers as receiving graduate level training either at the plant or in nearby universities.

Seventy-six per cent of the small plants surveyed said they aid their engineers through courses in engineering application; 55 per cent in engineering theory; and 27 per cent in non-engineering courses.

A number of firms pay all tuition and text book costs but the average firm pays only 50 per cent of the tuition. Some, like a St. Louis, Missouri, engineering firm, pay tuition on a graduated scale keyed to the trainee's classroom marks.

Fifty-nine per cent of the large plants surveyed said their employees are permitted to do advanced academic work on company time, while only 30 per cent of the small firms provided this advantage. University courses to meet almost any industrial requirement already are available in the larger centers of population, and in smaller centers, where they may not exist, they will be made available very quickly if industry expresses the need and indicates an ability to support such new courses by providing enough students to make them self-sustaining.

Industry's increasing interest in providing technical and management training for its engineers unfortunately is not matched to anywhere near so large an extent in one of the engineer's most important areas of activity—government. Federal and state agency executives who were questioned voiced their regret that existing policies make it difficult to spend public funds for training purposes.

...ain Its Engineers ?

American industry is rapidly becoming a post-graduate school for engineer training. Do you have the facts about this vital industrial development? If you are an engineer employed in industry or an engineering executive you owe it to your firm and to your own professional career to become acquainted with the dynamic engineer training programs that are standard on today's fast moving industrial scene.

THIS STUDY GIVES THE FACTS . . .

This research study, prepared by the Professional Engineers Conference Board for Industry in cooperation with NSPE, is a broad-gauge survey designed to bring nation-wide engineer training problems before you in the clearest possible focus.

Written in crisp, specific language, "How to Train Engineers in Industry" will show you how your own firm shapes up in the industrial training picture, while giving you detailed "how to do it" information. It has already proved an "eye opener" for training directors who thought they knew all the answers. Add this important study to your professional bookshelves.

The special price to NSPE members is $1.00, just one-half the regular cost. Here are facts and figures at your fingertips. Actual training charts and rating forms are reproduced for comparison with those used by your firm.

LOOK AT THESE CHAPTER TITLES!

- What Price Training?
- Typical Training Programs
- Training the Trainers
- Rating and Evaluation
- Guidance Toward Professionalism
- Orientation and Indoctrination
- How to Train Engineers in Industry —Summary and Recommendations

ORDER TODAY!

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The Price?

Just two dollars per copy for non-members of the NSPE; one dollar per copy for members. All four of the Conference Board reports, attractively boxed in a container suitable for display on a library shelf, may be ordered at a special price of $6.00 for non-members; $3.50 for members.

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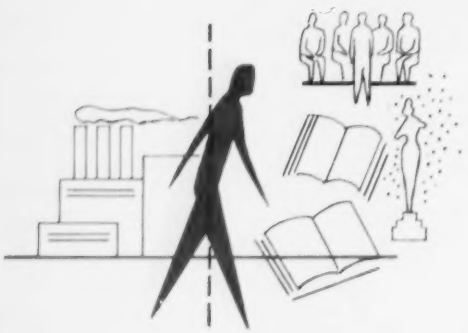


GUIDANCE TOWARD PROFESSIONALISM

Most of the individual engineers interviewed for the survey said, with varying degrees of qualification, that current industrial training programs are adequate for the immediate needs of the sponsoring companies, but they are weak in helping to create a climate for professional development and many do not meet the long term needs of the individual himself.

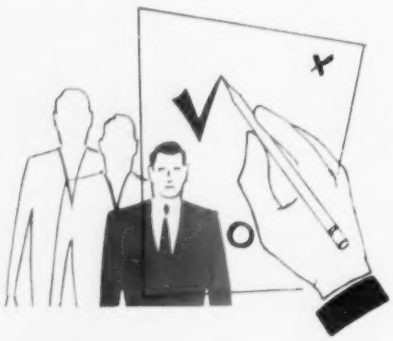
Existing programs designed to help fit the engineer for a better job are too narrowly channeled, and are directed toward training him in a specific field of activity rather than toward providing him with the breadth of background that it is impossible to attain within the necessarily limited curriculum of the engineering school.

Only a few companies actually encourage their engineers to develop culturally as well as technically, and make tuition refunds for liberal arts courses as readily as for those in the physical sciences and engineering.

Although the principle of broadening engineers' interests by encouraging liberal arts studies has not yet gained wide acceptance in industry, many companies are now attempting to stimulate the civic consciousness of their engineers by encouraging participation in community affairs. The prestige which comes through registration and participation in professional activities and the influence those activities have on the development of professional concepts in the young engineer are also being recognized by employers.

RECOMMENDATIONS

1. Increased attention to supervision and guidance for the young engineer, not only during his orientation period but for several years thereafter. This need not be through an expensive formal program, but no matter how informal the methods used, they should be based upon a definite plan, and the company's internal organization should be such as to furnish definite pathways along which the young engineer can develop.
2. More opportunities for advanced studies should be made available, not only in fields relating specifically to the young engineer's job but also covering those areas which will help to develop him into a well-rounded, educated person, as well as a competent technician.
3. A great extension of the principle of cooperation—



among industrial plants, schools, professional societies and community groups—so that the same facilities may become available for the small company as are now enjoyed by the large.

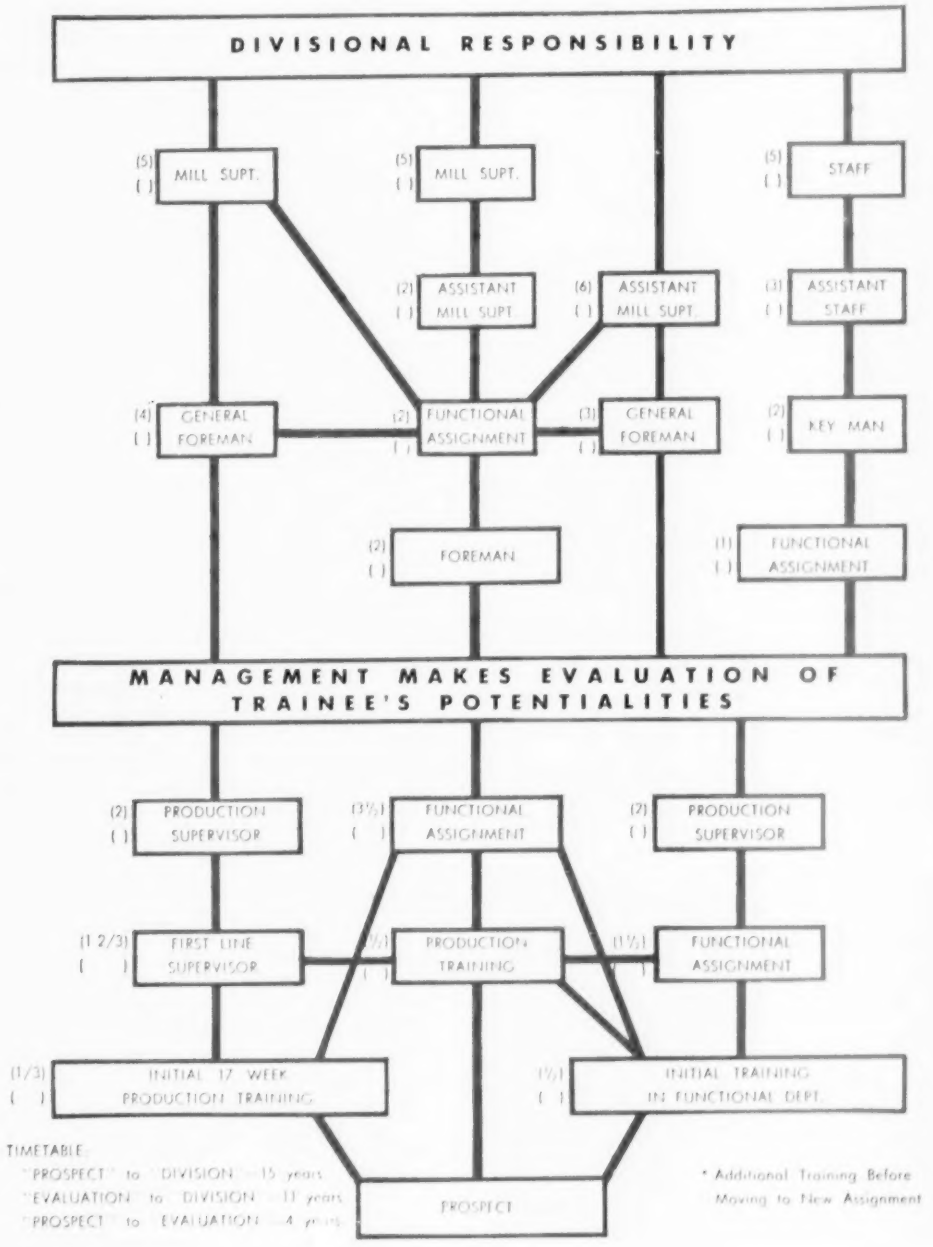
4. A greater interchange of information among employers about training methods and techniques.
5. Stimulation of engineers' interests in community and cultural activities.
6. Further encouragement of professional registration and participation in professional society activities.—*End.*

(See other side)

(Make checks payable to the Board)

Formal programs, which include classroom work, lectures, group discussions, and frequent conferences, characterize the larger companies. Below: A typical chart from the report which shows how trainees at the United States Rubber Company advance.

United States Rubber Company's | **ROUTES FOR ADVANCEMENT OF PRE-MANAGEMENT TRAINEES**


DIVISIONAL RESPONSIBILITY
(5) ( ) MILL SUPT.
(5) ( ) MILL SUPT.
(5) ( ) STAFF
(2) ( ) ASSISTANT MILL SUPT.
(6) ( ) ASSISTANT MILL SUPT.
(3) ( ) ASSISTANT STAFF
(4) ( ) GENERAL FOREMAN
(2) ( ) FUNCTIONAL ASSIGNMENT
(3) ( ) GENERAL FOREMAN
(2) ( ) KEY MAN
(2) ( ) FOREMAN
(1) ( ) FUNCTIONAL ASSIGNMENT
MANAGEMENT MAKES EVALUATION OF TRAINEE'S POTENTIALITIES
(2) ( ) PRODUCTION SUPERVISOR
(3½) ( ) FUNCTIONAL ASSIGNMENT
(2) ( ) PRODUCTION SUPERVISOR
(1 2/3) ( ) FIRST LINE SUPERVISOR
(½) ( ) PRODUCTION TRAINING
(1½) ( ) FUNCTIONAL ASSIGNMENT
(1/3) ( ) INITIAL 17 WEEK PRODUCTION TRAINING
(1½) ( ) INITIAL TRAINING IN FUNCTIONAL DEPT.
PROSPECT
TIMETABLE:
"PROSPECT" to "DIVISION" — 15 years
"EVALUATION" to "DIVISION" — 11 years
"PROSPECT" to "EVALUATION" — 4 years
* Additional Training Before Moving to New Assignment

A Public Service Discussion . . .

Are Air Raid Shelters Obsolete?

By A. G. PRIEST, P. E.*

As one who saw and personally experienced the unforgettable devastation caused by Allied bombs in Europe during World War II, the writer has remained conscious of the ever-growing possibility of a third world war, with its attendant problems for the general public in a nation subject to attack. Among the biggest of these problems is whether to stay where we are or try to find a safer spot . . . whether to go on working at our jobs or to run away somewhere else, whether to build a bomb shelter at home or to evacuate our familiar surroundings. . . .

This dilemma, shelters or evacuation, emerges in every country which could possibly be exposed to air raid attacks and must be cleared in the public opinion. It would be far better if the problem could be resolved in advance than to let a hasty decision be tested by an actual attack with all of the terrible consequences of a failure.

Our blessed country was never exposed to enemy air raids and even the possibility of an attack was rather remote until recently. Since, however, the Russians have the hydrogen bomb as well as the atom bomb, and since the Soviet Air Force is capable of delivering them anywhere in the world, the problem has become imminent and requires open discussion.

Let us not delude ourselves; the best interceptors and the best anti-aircraft artillery cannot completely exclude all enemy airplanes. It is highly probable that a small percentage of the raiders would be successful in hitting close to their targets. This percentage might be smaller or larger according to the extent of our preparedness and the efficiency of our active defense. Unfortunately, it probably will not be zero.

If the situation is realized, one can only wonder why the public remains so indifferent. Recently, many hundreds of thousands of our boys have seen with their own eyes the destruction from bombs a thousand times less effective in England, France and Germany. Also it is a wonder that the population has not become more nervous and uneasy after the horrible effects of new bombs were made known.

Mankind is defenselessly exposed to unknown hazards. Civil defense is lagging behind, at least in the minds of the general public. Something must be done immediately to prepare more adequately against the horrors of destruction from the air. The public would listen to the experts, if these could produce a unanimity of opinion and advice.

In the discussion of shelters versus evacuation, shelters start with a serious handicap. Shelters cost money, evacuation—or so people think at least—costs nothing. When the red warning sounds, I have often heard people say, "I will take my car and will get out of the town as quickly as I can." "Where?" somebody might ask. Or, "how?" Anyone who has tried to leave a large city quickly before an Independence Day or Labor Day week end would know better. Before such a week end, people are calm and are anticipating relaxation.

What would happen, however, in the tunnels, at bottlenecks in narrow streets and roads, when everyone is extremely agitated and frightened, when some of the main highways are closed for defense traffic, when one unfortunate occurrence can block a road or tunnel for precious hours? It is almost certain that the major portion of the population trying to escape could not reach their points of destination but would be exposed to the deadly radiation or to falling debris and would be in a much worse position than those who took shelter in their own basements or air raid shelters.

—Photos by I. Davidson

This type of shelter was not reinforced, a great advantage when steel became short. It was highly successful when used by the Germans during the war.

It is true that towns and cities could perhaps be evacuated in advance, although this cannot be taken for granted. But if a city is evacuated, the city is dead and the enemy has attained half of its aim without launching a single airplane and without dropping a single bomb. Cities have a certain function which must be continued under all circumstances and the more important industries must continue their manufacturing operations under all conditions. We should realize that most of us must stay where we are, come what may, otherwise we will be easily defeated. It is the first and perhaps most important principle of civil defense that the functioning of almost every branch of the administration, industry, trade and transportation shall continue

*This is a pen name for a professional engineer who came to this country from a central European state where he was a licensed air raid shelter designer during the war. With hostilities over, he fled to West Germany where he worked for the U. S. Government. With relatives still behind the Iron Curtain, he does not desire publicity concerning his wartime activities.—*Editor.*

before and after air raids, perhaps even under higher gear.

Children, housewives and old people should be evacuated as smoothly as possible, in any case well in advance, but the major portion of the population will be obliged to stay near its work areas. They must also stay close during the time when air raids might be expected since this time of expectation could last for weeks.

If average people are expected to stay in dangerous areas and do their duty, they must be offered the best protection that is economically feasible. Nothing lowers a person's morale more than the feeling that no provisions have been made to save his life, but yet he is still expected to go on working while in a state of complete defenselessness.

There is an easy and obvious argument against the provision of shelters; e.g., since bombs have grown so big, their effect is so destructive that no man-made shelter can withstand them. This is partly true, but only partly so. The area of a direct hit is only one fortieth to one fiftieth of the area of the complete and severe destruction. A well constructed shelter could offer almost complete protection only a few miles away from the "ground zero", whereas without shelters no human being could stay alive.

One thing must be mentioned about this "ground zero" which is very misleading for the average reader. Our public-spirited magazines are doing a wonderful job calling the attention of the public to the dangers of the nuclear age. While representing the possible damages of a hydrogen bomb, most representations show the bomb exploded in the center of a city and show further in concentric circles the probable limits of complete destruction, severe damage and moderate damage. Suburban dwellers looking at these charts, generally get the impression that they are safe since their houses or apartments are situated beyond these boundaries. Many people forget that it is only assumed that the bomb will explode exactly in the center of a city, the "ground zero" actually could be anywhere, perhaps quite close to our own homes. Indeed, not even the most remote place within many miles of the vicinity of a target city or plant could be considered safe since the attacker airplane, harassed by fighters or interceptors, may drop its bomb anywhere in order to get rid of it. This occurred in Europe very often. Frequently city dwellers deposited a portion of their clothing and valuables at some country house for emergency, only to find that the assumed safe place was destroyed while the exposed city house remained. The general case of course was more often the opposite.

WHAT protection could a properly built shelter offer? First of all, we must discard any idea of light and inflammable construction work in shelters. An adequate shelter must be an *underground*, windowless, reinforced concrete structure with a ceiling capable of supporting debris from the superstructure and having more than one exit for emergency. Although the effects of the latest hydrogen bomb on structures in the fringe areas are not yet released, every present indication suggests that the underground portion of a structure is always the safest. Times advance and war changes very rapidly. Today nobody is foolish enough to believe that it is enough to hide under a table or a desk. This would be better than nothing, of course, but very, very little better.

Since such a shelter is expensive, it should include only the minimum required space. A small shelter is

This shelter at Duesseldorf-Handweiser was intended to serve as a garage in peacetime, the rotunda being used as a ramp for cars. Curiously, it is now a church. Shelter capacity was 2,000 persons.

desirable also because the smaller construction makes a smaller target which is more resistant than a large one. In Europe about 100 cubic feet of space was allowed as the minimum required space for each person in a shelter. The writer believes that most basements could be reinforced in order to meet the requirements, or, if there is enough space in the back yard, an independent shelter might be built there and covered with soil. The equipment of the shelter should be as simple as possible. Mechanical appliances usually will have little value since, in case of an actual attack, electricity and water will probably be cut off first. A recently formed company is already doing a good business selling canned water. A supply of this should be maintained in the shelter.

It would seem necessary that the Civil Defense Board or some other competent authority should establish standard requirements and a testing station for shelters and it should be mandatory that only an approved type of structure and approved equipment as, for example, splinter resistant, gas tight doors, be permitted. The old principle *caveat emptor* (let the purchaser beware) cannot be maintained in such a highly technical matter, where millions of lives are at stake. The mandatory testing and approval would not exclude competition but would only assure that minimum requirements have been met.

The highly technical aspects should be boiled down to simple practical use. During World War II, many European countries arranged study courses in air raid shelter design and construction for graduate civil and structural engineers and architects and required by law that every air raid shelter had to be designed by a licensed air raid shelter design engineer. The National Society of Professional Engineers certainly might well inaugurate such a procedure. A great number of capable city-employed engineers would be required as well to designate the proper places for a shelter in each building and to control its construction. These city engineers should take the air raid shelter design course as well.

At the present time symbolic air raid shelters are designated in almost every large building. These are mostly places surrounded with windows and glass doors. It is a well known war experience, that while a "conventional" bomb destroys one building, it destroys all window glass within a circle of one mile in diameter from the bomb burst. The broken glass is a sharp and

(*Continued on page 40*)

An *American Engineer* SPECIAL REPORT

Re: Women In Engineering

● An optimistic view of the prospects for women in the professional engineering field is pointed up in the Department of Labor's recently-released Women's Bureau Bulletin No. 254. Entitled "Employment Opportunities for Women in Professional Engineering," the bulletin cites new encouragement being given to women to enter the engineering field particularly in view of the continuing large demand for engineers; but it also takes cognizance of the various obstacles to their employment, from traditional prejudice against women in "men's jobs" to the reluctance of some employers to invest in the training of women engineers who may soon thereafter resign because of marriage or home responsibilities.

The report attacks the contention that women as a group are potentially better subprofessional workers in the engineering field, terming it "either an unjustified assumption, or a compromise offered by employers who wish to avoid the risk of developing women as full-fledged engineers."

The responsibility for bringing about universal equality of opportunity for women in engineering employment, the bulletin claims, will for some time to come lie with the women engineers themselves. "Because they are so few in number, individual women are likely to represent women engineers as a whole in the minds of faculties and employers," the bulletin reminds them. "Clearly," it continues, however, "the standards for the training and employment of women engineers are more exacting than for men. As a result, a majority of successfully employed women are apt to be outstanding in the field."

Information and statistics for the bulletin, which was prepared under the direction of Mrs. Alice K. Leopold, were gathered from a wide variety of sources, including the National Society of Professional Engineers. Of particular interest also are some of the facts gleaned from a survey of the membership of the Society of Women Engineers, whose members are either college graduates in engineering, or else women with a minimum of six years' paid engineering experience at a level equivalent to the training required of a graduate engineer, and also women who, although having degrees in related scientific fields, have gained, in addition, at least two years of engineering experience at the professional level.

Two hundred sixty-four replies to the SWE questionnaire were received; and these showed that about four-fifths of the group were employed, nine out of ten at full-time jobs. Ninety-seven per cent had attended college, and 83 per cent of this number had undergraduate degrees. About 36 per cent had taken graduate work, with more than half completing it through the master's degree. Nine women had attained Ph.D. degrees, and several more were at work on them.

Two-thirds of the women reported undergraduate training in the engineering field, while another 27 per cent had specialized in mathematics, the sciences, or architecture. The median age was 28.9 years. Only 19 per cent of those reporting their salaries were earning less than $4,000 per year and half of these had been in their jobs for less than two years. Over half of the women in the $5,000-$6,000 bracket had been employed two to five years, while half of those making at least $6,000 had been employed at least five years.

Since the Women's Bureau estimates the number of professional women engineers in 1950 as close to 3,600, the SWE survey results admittedly cannot be taken as completely representative. It is, however, pointed out that the information obtained in the survey and reported by the Women's Bureau relates to women "whose professional engineering status is fairly well established according to the usual standards of education." And, furthermore, the geographical concentration of employed SWE membership is consistent with the geographical distribution of employed engineers, as determined by the 1950 census.

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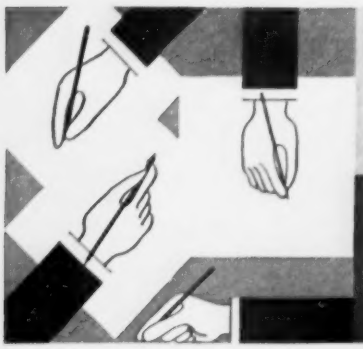

Professional POSTSCRIPTS

The piece that follows is a bit longer than our usual —PP— features but it carries a good message (plus some revealing history) about ethics and professional engineers. It's by Engineer Roy E. Argersinger, a former president of the Massachusetts SPE, and he has titled it, "Canons of Ethics for Engineers—Their History and Future Importance." This is a subject that should be of interest to all within the engineering profession and —PP— will welcome any thoughts from readers on Engineer Argersinger's piece. Here, then, is our story for this month.

—PP—

Before discussing the Canons of Ethics for Engineers, let us briefly review the background of our older present-day professional codes.

The oldest, of course, are those of the clergy, which reach back to early biblical times. They are also the most important, since they are the foundations for all other ethical codes.

However, those of the medical, legal and architectural professions are more relevant to the purposes of this paper. The medical code may be said to begin with the Oath of Hippocrates in the fourth century B.C., and so can be called the oldest. This Oath is no longer generally obligatory to the young physician's start in practice, although it is used in the graduating exercises in some medical colleges. Apparently, the earliest form of a present-day medical code was written by Dr. Thomas Percival, an Englishman who graduated from the University of Leyden in 1765 and published his code in 1803.[1] The American Medical Association was organized in 1846 and published a Code in 1847 built on that of Dr. Percival. The 1847 Code has been developed and amended through the years, and in 1903 became known as the "Principles of Medical Ethics of the American Medical Association."[2]

All young physicians on joining their local Medical Society must certify that they will abide by these "Principles."

The Code of the legal profession is not so old, but its fundamentals were largely covered in a series of lectures by Judge George Sharswood at the University of Pennsylvania in 1854 and these were used as standards for many years.[3] After the formation of the American Bar Association in 1878, there was discussion of the subject and, in 1908, the Association adopted "Canons of Professional Ethics" together with a recommended "Oath of Admission to the Bar," which is largely used throughout the United States.[4] The Bar Association also has "Canons for Judicial Procedure" governing specifically the conduct of judges, and "Rules of Procedure of the Standing Committee on Professional Ethics and Grievances."

The present "Code of Ethics" of the American Institute of Architects was adopted in 1947[5], but almost entirely duplicates the much older Code of the Boston Society of Architects. Like the other two professions, the young architects must obligate themselves to follow the Code before they can become members of a state architectural society or of the A.I.A.

Coming now to the engineers—the first records I have found showing interest in this topic begin in 1871 with a paper by R. P. Rothwell[3] before the American Institute of Mining Engineers on "Professional Morality."

In 1886 in a presidential address to the A. I. Mining E., on "Professional Ethics," J. C. Bayles outlined many points now covered in our codes.

In the same year, M. F. Durfee[3] before the A.S.M.E. discussed duties to public, to employer and to each other.

In 1892, *The Engineering News*[3] wrote editorially on the subject and urged formation of a Code.

Also in 1892, S. Whinery addressed the Cincinnati Engineers' Club on "Ethics of Civil Engineering."[3] He practically outlined a Code, drawing heavily on both form and substance of the medical code. His last item stated that the engineer should be more than an engineer "since he needs every kind of knowledge and culture that can be obtained." That is more than 60 years ago and we are just beginning to give some weight to that thought.

In June, 1893, a resolution was presented to a meeting of the A.S.C.E. for the appointment of a committee "to collect information and to consider the propriety of the adoption by the Society of a Code of Ethics for the profession and to make such other recommendations as the committee thinks proper"—Remember the date—June 1893.[3]

In 1896, a "Code of Engineering Ethics" was adopted by the "Canadian Society of Civil Engineers." It consisted of eleven paragraphs intended to cover: Duty of Engineer to Client, Obligations of Client to Engineer, Mutual Relations of Chief to Assistants, Engineers' Services to Each Other, Pecuniary and Advertising Matters and Duties of Engineer to Public.[3]

In May, 1902, the Report of the A.S.C.E. Board of Direction includes a report of the committee covered by the 1893 resolution, nine years earlier. They gave arguments for and against a Code and at the conclusion of debate, by vote the matter was dropped.[3] In 1906, Dr. Schuyler Skaats Wheeler gave a presidential address at the Milwaukee Convention of the A.I.E.E. on the subject of "Engineering Honor." It stirred the Convention to appoint a committee to draft a "Code of Ethics for Engineers."

The *1954 A.I.E.E. Yearbook*, page 590, gives briefly the remaining history of our present "Canons," but the following outline is presented in order to bring in certain corollary items.

In May, 1907, the committee reported a Code which was discussed at the June Convention and returned to the Board of Directors for revision. They had it printed and distributed to members for suggestions to be returned to a new committee to be appointed by the then President, H. G. Stott. That committee consisted of Dr. Wheeler, Chairman, B. J. Arnold, H. W. Buck, J. J. Carty, L. A. Ferguson, B. G. Lamme, J. W. Lieb, Jr., C. F. Scott, S. Sheldon, C. P. Steinmetz and L. B. Stillwell.

No further action was taken by the Directors until 1911 when on their authority the then President, D. C. Jackson, appointed a new committee to take up the work. The members were George F. Sever, Chairman, H. W. Buck, Samuel Reber, Charles P. Steinmetz, H. G. Stott, and Schuyler S. Wheeler. He also appointed an Advisory Committee of 18 members as named in the *Yearbook* history. You will note the high calibre of the men on these committees. This action also, I believe, marks the active official entrance of Dr. Jackson to this project, an interest he maintained for many years thereafter.

This committee reported a Code to the Board on February 9, 1912, and, at the meeting, the title was changed to "Code of Principles of Professional Conduct" and it was tentatively adopted for study. After a month's consideration of numerous suggestions, the Board formally adopted the Code as redrafted on March 8, 1912.

This Code was in the same general form as previous drafts. It contained 22 items and it is interesting to note that 12 of the 14 paragraphs in the "Code of Business Practice," which we now maintain with our "Canons of Ethics," are taken word for word from this 1912 Code.

In June, 1914, the A.S.M.E. adopted a Code of Ethics which, with a few additions, was the same as the 1912 A.I.E.E. Code.[6]

In September, 1914, the A.S.C.E. adopted a short Code of Practice of six paragraphs, largely on matters of employment.[6]

In 1918, the A.S.M.E. appointed a committee to revise their 1914 Code. This com-

MAY MEETINGS Of Note

The Electrochemical Society — 107th Meeting, May 1-5, Sheraton-Gibson Hotel, Cincinnati, O.

Society of American Military Engineers — Annual Meeting, May 5-6, Waldorf-Astoria, New York, N. Y.

National Fire Protection Association — Annual Meeting, May 16-20, Hotel Netherland Plaza, Cincinnati, O.

American Society for Quality Control — Annual Convention, May 23-25, Hotels Statler and New Yorker, New York, N. Y.

Air Pollution Control Association — Annual Meeting, May 22-26, Sheraton-Cadillac Hotel, Detroit, Mich.

American Institute of Mining and Metallurgical Engineers (Rocky Mountain Petroleum Sections)—Joint Meeting, May 26-27, Shirley-Savoy Hotel, Denver, Colo.

National Rivers and Harbors Congress —42nd Convention, May 31-June 1, Mayflower Hotel, Washington, D. C.

mittee reported a draft in 1920, but it was sent back for revision and an effort was made, apparently for the first time, to get united consideration from other societies. A Joint Committee was organized for the purpose with representatives from A.S.M.E., A.S.C.E., A.S.MiningE., A.I.E.E., A.S.H.V.E. and A.S.Refrig.E.[6]

On a symposium on Codes of Ethics published in the May, 1922, copy of *The Annals* of The American Academy of Political and Social Science, this Joint Committee by its Chairman, Prof. A. G. Christie, published its proposed Code and recommended that it be adopted by all engineering societies.

In this same symposium, other engineering Codes were published, including those previously adopted by A.I.A., A.I.E.E., A.S.C.E., A.S.M.E., Engineering Institute of Canada and that of the American Association of Engineers, which had approved a Code of eight paragraphs written by Isham Randolph and differing somewhat from the others in that it referred to principles of integrity and honor more than to rules of conduct.

No general conclusive action was taken regarding the Joint Committee's Code and sponsorship for it was taken over by the American Engineering Council with a committee under the chairmanship of Dr. D. C. Jackson.

In 1923, the Practice Committee of the American Association of Engineers under E. E. Carpenter as Chairman, began the preparation of a new code. This was completed the following year under Dr. D. B. Steinman as Chairman, and adopted by the Board of Directors of the Association in 1924.[7]

It bore a realistic title—"Specific Principles of Good Professional Conduct" and contained 51 paragraphs, thus being longer than any of the earlier codes. However, it contained 11 paragraphs on "Relations of the Engineer to Employees," whereas our present "Canons" contain only two. Otherwise, it covered much the same ground.

In 1927, the American Association of Engineers adopted the "Engineer's Vow of Service" written by Dr. D. B. Steinman.[7] It is longer than the new "Engineers' Creed," referred to later, but the "Creed" has copied from the "Vow" the following paragraph—"To place service before profit, the honor and standing of the profession before personal advantage and the public welfare above all other considerations."

When the American Engineering Council was disbanded in 1940, responsibility for the Joint Code Committee was assumed by Engineers' Council for Professional Development. Dr. Jackson remained as Chairman until 1948, and gave to the work a great deal of time and labor. His efforts were successful when E.C.P.D., in October, 1947, with the assent of seven of its eight constituent societies, approved the present "Canons of Ethics" and recommended their adoption by the separate societies. The Board of Directors of the A.I.E.E. adopted them on November 5, 1947, and the Institute's complete "Statement of Principles of Professional Conduct" embodying the Canons was adopted by the Board of Directors on August 4, 1950.

They have, as of 1954, been adopted by 48 engineering societies, including all the Founder Societies and among others, the American Association of Engineers, the National Council of State Boards of Engineering Examiners, the Engineering Institute of Canada, Association of Professional Engineers of New Brunswick, Association of Professional Engineers of Nova Scotia, Engineering Association of Hawaii, Puerto Rico Society of Professional Engineers, together with 27 State Societies of Professional Engineers.

A new feature was brought into this general situation in June, 1954, when the National Society of Professional Engineers at their Annual Meeting in Milwaukee adopted an "Engineers' Creed." It is the result of discussion over a period of about four years in committees and the Board of Directors. It has probably been read by many of you as it was published in the July and November issues of the AMERICAN ENGINEER.

Having these "Canons of Ethics," are we to assume that we can now fold our hands, relax and assume that the task which has lasted for more than 80 years is now completed? I'm afraid not.

Murmurs of desired changes are already heard. We must remember that both the A.I.E.E. and the A.S.C.E. have supplementary Codes. Some of the State Professional Engineering Societies do also. If each society changes its own Code independently (and I know of nothing to prevent that), uniformity will gradually be lost.

I would like to suggest that the National Society of Professional Engineers be requested to collect these existing supplementary codes from the groups that have adopted the "Canons," edit these supplementary codes to eliminate duplications and unify as much as possible of their contents into a single code; then publish, after approval, the "Canons" (without change) and the unified supplementary code in a pamphlet, with an identifying title, similar to those which are now used by the other professions. The work might be supported by the cooperating societies on a subscription basis and, of course, the pamphlet would have to be revised and republished occasionally.

Having such a pamphlet with a distinctive name, every young engineer on entering the profession should express his purpose to conform to its provisions. The Bylaws of the various engineering societies should be modified to require such an expression as a condition for membership. The "Engineers' Creed" previously referred to might well be modified for such use.

These ethical principles are important and should be emphasized. I recently asked two engineers (not A.I.E.E. members) for copies of their "Codes of Ethics." Neither had them or seemed to know where they could be found.

In the symposium of 1922, C. H. Whitaker, Editor of the *Journal of the American Institute of Architects*, speaking on "Interrelation of the Professions," said: "If history means anything, it means that no civilization has a chance to survive except as the forces of knowledge and skill can remain socially victorious over selfish interest; except as all vocations rest upon the basis of that freedom which not only enables but inspires man to put the honor of their calling above the reach of client, corporation or government—which means, does it not, above the reach of their own weaknesses."

We are engaged today in a world struggle to preserve and extend that basis of freedom, and the work of engineers is vital to the success of that effort. Our Codes are guideposts outlining the ways in which we can work. They will help to give us group action and consequent strength and the more we jointly insist on their application, the more effective they will be; but they must be readily available, we must know them, we must follow them. To do that, we shall have to place "The honor of our calling above our own weaknesses."

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[1]Mass. Medical Society—Dr. R. W. Buck.
[2]Manual of Mass. Medical Society 1954.
[3]A.I.E.E. Transactions 1906—"Engineering Ethics" by Schuyler Skaats Wheeler.
[4]"Canons of Professional Ethics"—American Bar Association, 1155 East 60th Street, Chicago.
[5]American Institute of Architects—Document 330.
[6]"The Annals" of the American Academy of Politics and Science—May 1922.
[7]Ibid—January 1955.

New York State Society of Professional Engineers—Annual Meeting, May 12-14, 1955, Commodore Hotel, New York, New York.

Indiana Society of Professional Engineers—Annual Meeting, May 14, 1955, Hotel Severin, Indianapolis, Indiana.

NSPE Annual Meeting — June 2-4, 1955, Bellevue-Stratford Hotel, Philadelphia, Pennsylvania.

Pennsylvania Society of Professional Engineers — Annual Meeting, June 2-4, 1955, Bellevue-Stratford Hotel, Philadelphia, Pennsylvania.

California Society of Professional Engineers — Annual Meeting, June 2-4, 1955, Statler Hotel, Los Angeles, California.

Michigan Society of Professional Engineers — Annual Meeting, June 9-11, 1955, Gratiot Inn, Port Huron, Michigan.

Georgia Society of Professional Engineers—Summer Meeting, June 17, 18, 1955, General Oglethorpe Hotel, Savannah, Georgia.

April Election Story Corrected

A story appearing in the April issue of the AMERICAN ENGINEER erroneously credited the Nominating Committee with the official announcement of the election of the NSPE officers for the 1955-56 term. It should have been stated that the announcement was made by the Tellers' Committee following an official count of the ballots at National Society headquarters.

Samuel G. Nordlinger is chairman of the committee which confirmed the election of Allison C. Neff as incoming president heading the slate of new officers as announced last month. Other members of the committee are William L. Dunn, Raymond C. Knight, Thomas S. Rogers, Max S. Herzog, and Nelson P. Greller. All are members of the District Society of Professional Engineers.

N.S.P.E. Believes

THE ENGINEER-IN-INDUSTRY CONFERENCE

BY PAUL H. ROBBINS, P.E.

Executive Director

N.S.P.E.

It is a well-known fact that at least four out of five members of the engineering profession are employees. The majority of these, of course, are employed in industry. The membership of NSPE, composed as it is of individuals in all branches of the profession, would be expected to show this same percentage. It is interesting to note that the 1954 Salary Survey shows four out of five of the respondents place themselves in the employee category.

Thus, it is only natural that NSPE would be deeply concerned with the relationships of the engineering profession and industry, each having such a mutual interest in the development of the other. Concern has been felt in the profession and in industry over the atmosphere in which engineers work. A number of committees of the National Society of Professional Engineers have been studying various facets of this problem and have published reports based on their surveys and studies. Members of NSPE are well aware of the Executive Research Survey Reports, the fourth of which has just now been released (see page 19), which have concentrated on four major problems of this engineering-industrial relationship. The Engineer-in-Industry Committee of NSPE has been deeply concerned with the problem of collective bargaining and the professional relationships inherent in this development. The recent publication of this committee, "A Professional Look at the Engineer in Industry," has endeavored to correlate the historical background of the problem and to present a series of suggestions for mutual cooperation between management and the engineering profession by which the most favorable atmosphere possible can be created, so that the engineering profession can make its maximum contribution to the industrial economy of our nation. NSPE believes these have all been worthwhile steps in providing the highest contributions to the welfare of the country.

At the same time, however, the committees and the Society have recognized these are not the complete answer to the picture, and it seems essential that industrial representatives and those deeply concerned with the development of the profession have an opportunity to discuss ways and means by which further solutions to these problems may be attained. The forthcoming Industry-Engineering Conference at the NSPE Annual Meeting in Philadelphia, June 2-4, will provide this opportunity. The program (see page 12), it will be noted, presents a number of outstanding industrial engineering leaders who will give their observations on various aspects of these important relationships. The afternoon session, devoted to a discussion of questions from those attending, will provide an opportunity for further development of some of the aspects presented in the reports already published.

Those attending the session will come from chapters and state societies throughout the United States, from areas where there may be significant variation in the highlights of the industry-engineering relationship. This means that through the questions a sort of "grass roots" check will be made on the specific stresses pointed up by the nationally-known participants in the Conference. And this certainly will be an excellent and most desirable achievement.

NSPE believes that much can be gained from this "give-and-take" discussion. Members of both industry and the profession will be given a chance to present to the NSPE committees and leaders additional items which need further study, as well as suggested ways and means for further implementing the ideas already presented.—***End.***

With Our Members . . .

Ohio News

1955 Convention Draws Record Crowds; P.E.'s Install New Officers

More than 300 members and guests were on hand for the 77th convention of the Ohio SPE, which was held at the Sheraton-Gibson Hotel in Cincannati, March 24-26.

Among the prominent persons who addressed the various luncheon and banquet meetings were: Clarence T. Shoch, president of the National Society; Allison C. Neff, NSPE president-elect; C. J. Freund, dean of engineering, University of Detroit; and William L. McGrath, president of the Williamson Heater Co. and U.S. employer-delegate to the International Labor Organization. Other industrial leaders addressed the various functional group meetings which were highly popular among those in attendance.

A constitutional amendment granting Society voting privileges to engineers-in-training was passed during the meeting. Another highlight was the presentation of the OSPE's highest award to Sol A. Bauer, Cleveland engineer and surveyor.

New Officers For East Bay Chapter

New officers of the East Bay Chapter of the California SPE were installed recently during a dinner meeting in Berkeley. W. H. T. Holden, president of the CSPE, acted as installing officer and was also the principal speaker of the evening.

The new East Bay officers are: Earl M. Buckingham, president; E. Ogden Driggs, first vice president; Fitzhugh Lee Avera, second vice president; Robert H. Jones, secretary; Howard J. Dauphinee, treasurer; and Harold A. Johnson, state director. New chapter directors are Clarence B. Coleman, Alex S. Nadelle, and Alton L. Wilson.

Frazza Speaks At D. C. Meeting

Louis F. Frazza of Hawthorne, N. J., NSPE vice president for the Northeast Region, was the guest of honor at a recent meeting of the District of Columbia Society of Professional Engineers. Mr. Frazza, who is manager of direct sales, Transite Pipe Department, Division Headquarters, Johns-Manville Sales Corporation, spoke informally on the subject, *Our Profession*.

San Jose P.E.'s Hold Annual Dinner

The Annual Meeting of the San Jose Chapter of the California SPE was held on April 12th. George L. Sullivan, dean of the Engineering School of Santa Clara University, who will retire at the end of the current school year, was the guest of honor, while Robert J. Parden, who will succeed to Dean Sullivan's post, was the speaker for the evening.

Joe B. Butler Dies; Missouri Nat'l. Director

One of the most active and prominent members of the National Society and the Missouri SPE—Professor Joe B. Butler, chairman of the Department of Civil Engineering, Missouri School of Mines and Metallurgy—died on Sunday, March 27th, in Rolla, Mo.

A member of the NSPE board of directors at the time of his death, Professor Butler was particularly well known for his efforts in behalf of increased membership for the professional societies. He was also a past president of the Rolla Chapter of the MSPE and organization president of the Missouri Society itself, a past president of the Mid-Missouri Section of the ASCE, a director of the St. Louis Engineers Club, and a member of many civic organizations.

Plans Are Complete For New York Convention

Plans are now complete for the Twenty-Ninth Annual Convention and Engineering Industries Exposition of the New York State Society of Professional Engineers, which is scheduled for May 12-14 at the Commodore Hotel in New York City, according to word from the State Society's headquarters.

Mayor Robert H. Wagner is scheduled to open the convention with a special address of welcome, and Dean Thorndike Saville of New York University has accepted an invitation to be the principal speaker at the closing luncheon.

Samuel Carr is serving as general chairman in charge of convention arrangements.

. . . more news on page 35

MEETING PRINCIPALS—The picture at the left, below, was taken during a recent meeting of the Chicago Chapter of the Illinois SPE. Left to right are: Harold F. Sommerschield, chapter president; John Dolio, ISPE chapter representative; Virgil E. Gunlock, NSPE vice president and chairman of the board, Chicago Transit Authority; Linas H. Brown, program chairman; and John G. Duba, chapter secretary-treasurer. Mr. Gunlock was the guest speaker, discussing "Urban Transportation—A Necessary Community Facility."

At the right is a picture of the newly-elected officers of the Ohio SPE. Photographed, l. to r., during the Society's annual meeting are: Douglas T. Greth, vice president; Stephen Kuhner, vice president; C. Ramond Hanes, president; Alfred H. Samborn, vice president; Earl Hineline, treasurer; and H. Bruce Baty, secretary.

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Restricted to Registered Professional Engineers . . . Directory Continued on Next Page

Professional Organization Is Panel Theme

Members of the North Shore Chapter of the Massachusetts SPE met recently with the Lynn General Electric Engineers Council in Saugus, Mass., to hear a panel discussion on the three professions—medicine, the law, and engineering.

Dr. Robert S. Buck, executive secretary of the Massachusetts Medical Society; Guy A. Newhall, a prominent Lynn attorney, and Roy E. Argersinger, a past president of the MSPE were the participants in the panel, discussing the organization and ethical standards of their respective callings. Duane E. Kimball served as meeting chairman; and following the presentation of the papers of the panel participants, there was a question and answer period for the engineers in the audience.

NORTH DAKOTA SPE OFFICERS—Officers of the North Dakota Society of Professional Engineers are shown in the picture at the right as they were photographed during a recent State Society meeting. They are, left to right: L. W. Veigel, president; Kenneth Haugrud, secretary; Edward Booth, national director; and A. W. Anderson, past president. Mr. Veigel's home is in Dickinson; the other officers live in Bismarck.

Illinois Annual Meeting

Dr. Kenneth McFarland, economic consultant to General Motors Corporation, was the guest speaker at the banquet which climaxed the 70th annual meeting of the Illinois SPE. The Faust Hotel in Rockford was the scene of the three-day event, March 31-April 2, which attracted engineers from throughout the State to hear the discussions of various professional problems and reports on Society activities.

Industrial inspection trips, social activities, and a special program for the ladies were also included in the schedule. NSPE President Clarence T. Shoch was another featured speaker, as was Frank Spence, executive secretary of the Chamber of Commerce.

Savannah P.E.'s Hear Educators

Dr. William Early, superintendent of schools in Savannah, Georgia, and Arthur Gignilliat, registrar of Armstrong College, were the guest speakers at a recent meeting of the Savannah Chapter of the Georgia SPE. Each discussed facets of the technical education problem.

. . . more news on page 37

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Lectures on a wide variety of subjects have been reported as program features at recent meetings of a number of the chapters of the New York State SPE. — N. W. Dougherty, dean of engineering at the University of Tennessee, was the guest of the Erie County Chapter, speaking on *Ethics for Engineers. A Survey of Automation* was the topic covered by Robert J. Bibbero, chief development engineer of the Hillyer Instrument Company, in an address before the members of the New York Chapter.

Engineering Problems in Evaluating Consumer Goods was discussed for the Kings County engineers by Ephraim Freedman, director of Macy's Bureau of Standards, who is an engineer himself. Members of the Albany County Chapter recently heard Joseph L. Rosenholtz, head of the Department of Geology, Rensselaer Polytechnic Institute, speak on the subject of *Diamonds — Gem Stones.*

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Veterans Administration Needs Engineers

Qualified engineers and architects are needed for alteration, construction and modernization of veterans' hospitals in Washington by the Veterans Administration. The job openings, which are in the GS-9 and GS-11 grades, are located in Washington, D. C. and are for the following positions: architectural engineer (estimating and/or specifications), civil engineer (sanitary), electrical engineer, mechanical engineer (heating, plumbing, ventilating, and/or air conditioning), structural engineer (buildings), and architect (design).

Applicants, it has been announced, do not have to take formal Civil Service examinations at this time in order to apply since they will be considered on the basis of education and experience as set forth in their applications. Interested persons should complete the standard Federal Application Form 57 and mail it to the Central Office Personnel Service, Veterans Administration, Washington 25, D. C.

Preview of Salary Survey Statistics

Four out of five NSPE members are employees. This figure is gleaned from a preview of the Salary and Fee Committee Salary Survey of NSPE members for 1954, according to Vice Chairman Noah E. Hull.

Furthermore, engineering employees increased their median earnings in all fields of employment from 2% to 9%, from the period 1952 to 1954. Federal Government employees reflected the smallest gain with an increase of 2%; while engineers employed in public utilities made an advance of 9%. The following table shows the salary and percentage increase by field of employment for members who reported their status as employees.

Field of Employment	1952	1954	Increase
Industry	$8,420	$8,940	6%
Education	7,590	8,080	6%
Public Utilities	7,400	8,060	9%
Federal Government	7,300	7,470	2%
County Government	6,490	7,010	8%
State Government	6,300	6,850	8%

Since it was found desirable to refine the classification of self-employed engineers, it appears that comparable statistics for the self-employed do not lend themselves as readily to comparison at this time as those for employees; however, it can be reported that the median income for private practitioners was $12,040 and for contractors $10,030.

Letters

(*Continued from page 5*)

ber of the Committee on Patent Office Enrollment, who is a Supervisory Examiner, was "The professional engineer is not held in high regard here." The professional engineer is hindered at every turn in his attempt to secure registration to practice before the Patent Office and the Office takes absolutely no notice of the existence of the engineering registration statutes.

NSPE earlier considered this question in committee and decided that there was a limited field of interest. The situation is now so unhealthy that it is proper to call it to the attention of the membership to elicit comment and possibly develop Society policy on the question.

LEONARD M. TODD, P. E.,
New York, N. Y.

Phila. Meeting Features Exhibits

The NSPE Annual Meeting, June 2-4, 1955, at the Bellevue-Stratford Hotel in Philadelphia will feature many exhibits. The following exhibitors have reserved booth space:

Adelphia Automatic Sprinkler Co.
Aero Service Corp.
American Testing Laboratories, Inc.
Armco Drainage & Metal Products, Inc.
Babcock & Wilcox Co.
Beaumont Birch Co.
Beemer Engineering Co.
R. D. Bitzer Co., Inc.
Blankin Equipment Corp.
Bradley Co., Inc.
Burndy Engineering Co.
Bustin Steel Products Inc.
C & D Batteries, Inc.
Cleveland Fuel Equipment Co.
Combustion Engineering Inc.
Copperweld Steel Co.
G. & W. H. Corson, Inc.
Robt. A. Cummings, Jr. & Associates
Eastern Lift Slab, Inc.
Electric Service Manufacturing Co.
H. E. Fletcher Co.
Flow Engineering, Inc.
Formigli Corp.
Friden Calculating Machine Co., Inc.
The Fyr-Fyter Co.
General Electric Co.
Geo-Optic Co., Inc.
Golden-Anderson Valve Specialty Co.
Gould-National Batteries, Inc.
I-T-E Circuit Breaker Co.
Inertol Co., Inc.
International Textbook Co.
Keasbey & Mattison Co.
Ellis M. Landis
Leeds & Northrup Co.
Lehigh Structural Steel Co.
Lexington Electric Products Co.
Manu-Mine Research & Development Co.
Harry Mather, Inc.
Monroe Calculating Machine Co., Inc.
Morse Boulger Destructor Co.
Nickel Cadmium Battery Corp.
Piasecki Helicopter Corp.
Pittsburgh Reflector Co.
Raymond Concrete Pile Co.
Roller-Smith Corp.
Rowe Methods, Inc.
Rumsey Electric Co.
Selas Corp.
Standard Transformer Co.
Theodore Alteneder & Sons
Thompson Electric Co.
Trion, Inc.
United States Lift Slab Corp.
Walker of Conshohocken
Warren-Knight Co.
Water Service Laboratories, Inc.
Westinghouse Electric Corp.
Wild Heerbrugg Instruments, Inc.

The exhibits cover an unusually wide range of products and services and should be of interest to engineers in any phase or branch of the profession. In addition to the members of N.S.P.E., engineers from other societies and engineering students in the Delaware Valley area are invited to inspect the exhibits.

The exhibit hours will be 9:00 A.M. to 6:00 P.M., all three days of the meeting.

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An Engineering Problem ?
Consult the Professional Directory

STRICTLY BUSINESS

Personalities . . . Rear Admiral Wilson D. **Leggett, Jr.,** USN (Ret.), former chief of the Navy's Bureau of Ships, has been appointed vice president of engineering of the **American Locomotive Company,** according to **P. T. Egbert,** ALCO president. . . . **Graham Barton** has been appointed supervisor of engineering of **Walsh Metal Products,** Detroit, a division of the **Michigan Oven Company.** . . . **J. C. Cleaver,** president of the **Cleaver-Brooks Company,** Milwaukee, has announced the appointment of **Elmer H. Wegner** as vice president of manufacturing. . . . The board of directors of **The Lincoln Electric Company,** Cleveland, has announced the appointment of **L. K. Stringham** as vice president in charge of engineering, succeeding **George Landis** who has been named vice president in charge of research. . . . Engineers **John M. Lancaster** and **Joseph V. T. Kempton** have joined the staff of **Fenwal Incorporated,** Ashland, Mass. . . . The **Niagara Blower Company** has announced the election of **Martin H. Olstad** as vice president in charge of engineering and **William M. Mosler** as secretary. Mr. Olstad's office is in New York City, while Mr. Mosler's is at the company's Buffalo plant.

Adm. Leggett

Atlas Powder Company has made known the appointment of **William H. Ruth, Jr.,** as director of the company's Ordnance Materiel Division with headquarters in Wilmington, Del. **Harold B. Palmer** succeeds Mr. Ruth as general manager of **Volunteer Ordnance Works,** Chatanooga, Tenn., which Atlas operates for the Army Ordnance Corps. . . . **George J. Nicastro** has been named to head the recently opened New York City office of the **Pacific Coast Engineering Company, Inc.,** according to **Will C. Hall,** president of the Alameda, California, firm. . . . **L. D. Huffman** has been named director of engineering of **The Colson Corporation,** Elyria, O. . . . **James L. Hoyer,** formerly principal in the Washington, D. C., consulting firm of **James L. Hoyer & Associates,** is the newly appointed national product manager in charge of air conditioning for **Rheem Manufacturing Company,** Chicago. . . . **A. M. Davis** has joined the Powerplants Division of **Marquardt Aircraft Company,** Van Nuys, Calif., as chief of engineering and manufacturing services. . . . **L. W. Eighmy, Jr.,** has been promoted to manager of the Power Department of **The Kerite Company,** New York.

Mr. Nicastro

John N. Beckley has been named vice president and eastern district manager of **The Austin Company** and will have offices in both New York City and Roselle, N. J., according to **George A. Bryant,** president. . . . **H. L. Stockdale** has been appointed to the presidency of the **Insul-Mastic Corporation of America.** . . . **Dunstan Graham** has been named department head of flight control systems of the Grand Rapids Division of **Lear, Inc.** . . . **H. A. Saurbrey** has been elected a member of the board of directors of the **Mellon-Stuart Company,** Pittsburgh. . . . **Charles E. Beaver** of Bound Brook, N. J., has been elected a vice president of **Research-Cottrell, Inc.** . . . **Trevor Clark** has been appointed assistant to the engineering manager of **Westinghouse Electric Corporation's** Air Arm Division. . . . **The Babcock & Wilcox Company** has announced the appointments of **Paul R. Grossman** as director of research, with offices in Alliance, O., and of **L. S. Wilcoxson** as vice president in charge of the Boiler Division, as well as the election of **M. Nielson** to the newly created post of executive vice president.

Mr. Graham

New Firms and Services . . . Five Carnegie Tech professors in the Department of Chemical Engineering have combined their consulting practices to form **Associated Chemical Engineers,** a consulting partnership with offices at 5118 Beeler St., Pittsburgh. The partners are **R. B. Beckman, L. N. Canjar, R. R. Rothfus, H. L. Toor,** and **D. H. Archer.** Their firm will offer services in petroleum, chemical and allied process industries in the tri-state area. . . . Formation of the industrial design firm of **Currie and Van Dyck** has been announced in Southport, Conn., by the two principals, **Thomas Currie** and **Kenneth Van Dyck.** . . . **Brown & Blauvelt,** consulting engineers of New York, **Jack Amman Photogrammetric Engineers** of San Antonio, Tex., and **Geophoto Services,** consulting geologists of Denver, Colo., have announced the pooling of their facilities to form the **International Resources Engineering and Exploration Group** (IREX). Formation of the group does not represent a merger but coordinates the related facilities of the three companies to provide an integrated service in all phases of natural resource studies.

Changes of Ownership . . . The New Haven, Conn., engineering firm, formerly known as **Newman E. Argraves & Associates,** has changed ownership and become **Philip W. Genovese & Associates,** with a new address of 294-296 Elm St. . . . The assets of the Controls and Instrument Division of the **Perfex Corporation** of Milwaukee have been purchased by the **General Controls Co.** of Glendale, California, according to an announcement by W. A. Ray, General Controls president.

Exhibitions . . . The **World Plastics Fair and Trade Exposition,** which had originally been scheduled for April, has now been rescheduled for October 5-9 at the National Guard Armory in Los Angeles.

Shelters

(From page 27)

dangerous projectile which shoots through rooms, and can cause far too many serious casualties or deaths. This is always a by-product hazard of any bomb.

BROKEN windows pose another problem, especially during the wintertime. Observers noticed that during World War II in Europe many more people died from pneumonia and cold due to unheated rooms with broken windows and also as a result of sitting in cold and damp air raid shelters than those who died from the direct effects of the bombs. Such secondary effects of air raids could be minimized by suitable advance planning, the establishment of properly designed shelters and by the organization of personnel in all businesses. Today, however, very few people in our country even bother to think of future protection requirements.

The third effect of an air raid is the most demoralizing total loss of property, including all personal belongings, clothing, furniture and houses. Radiation or only a little spark can cause a fire which will quickly destroy an unattended house whose proprietor has escaped in his car. During the last war thousands of houses were saved from destruction with a few cubic feet of sand and a couple of hundred gallons of water.

> **. . . The hazard from both burn and blast effects in the outer affected areas would be reduced greatly by shelter. Clothing or almost any kind of shelter would reduce the danger of direct burns, although there might be some danger of clothing and structures becoming ignited. Also, shelter would materially reduce the hazard of blast injury by affording protection against flying or falling debris. The Federal Civil Defense Administration has made extensive studies of shelters and has issued plans for several simple and inexpensive types which can be utilized by householders. As is generally known, the shelter afforded by ordinary city buildings would not suffice within the central area surrounding the point of burst of a large nuclear weapon. For this reason, the Federal Civil Defense Administration recommends evacuation of the central areas of target zones on early warning of approaching attack.—From recent report, Atomic Energy Commission.**

A relinquished house is also open for pilferage. American people are basically honest, so that today bicycles, laundry or other things are left outdoors almost anywhere in the country overnight, without fear of loss. People change rapidly, however, when they lose their personal belongings, or when they think that a house or apartment is completely abandoned and that its owner probably has been killed.

Who should establish air raid shelters? In several European countries it was mandatory that every landlord build a shelter if the house had more than 20 inhabitants. In the United States, however, it would be a big step forward, if the voluntary establishment of shelters would be encouraged by wide publicity in magazines and newspapers, with expert advice, tax write-offs or that higher rents be allowed where shelters are provided. The Government Printing Office has already published valuable books and pamphlets on the design and construction of typical shelters. These can be used as a guide for the establishment of shelters for special conditions or locations.

Now, in peacetime, building materials, cement and steel reinforcing bars as well as structural steel can be purchased in unlimited quantity. Labor is also available. This situation would change completely and immediately if war should begin. The civilian population would find it almost impossible to obtain enough building material for the private air raid shelters on which their lives would depend.

In specially congested areas with many incidental visitors such as the business districts of large cities, the city or municipality should construct large public air raid shelters which might be used as garages in peacetime. In Germany a large number of such shelters were constructed for 1,000 to 4,000 persons each, with heavily reinforced walls 5 to 6 feet thick and a 7 to 8 foot thick roof. The writer personally inspected a number of these public shelters after the war and did not find even one which was destroyed by bombs although a few of them got direct hits or close calls.

INDUSTRIAL DEFENSE is a separate problem. This is making good progress. The April 15, 1954 issue of *Engineering News-Record* deals with this topic under the title, "H-Bomb Compels New Look At Blast Design." The article states that the Armed Forces and Civil Defense offices are working to develop low cost protective measures against fringe-area structural damage. It is also stated that the structural strength and blast resistance of existing buildings can be increased by as much as 100 per cent at an added cost of only 5 per cent to 10 per cent.

Shelters cost money and many people think it would be wasted money. Who should pay the cost? The writer feels that shelters are basically another form of life insurance which should be paid for by the same person who pays your fire, burglary and other insurance. We must face the facts and be realistic. H. G. Wells said after the first World War that in the Twentieth Century mankind arrived in "the century of world wars." His use of the plural astonished many people who thought that after the horrors of World War I, the nations would have gained enough wisdom to avoid another war.

Since then we have already experienced another war, the far more terrible World War II. There is now an unpleasant possibility of a World War III in the not far distant future. Preparedness does not only mean armament preparation, since being defenseless provokes attack. Preparedness also means the preparation of our homes and industries against the effects of air attack. At least two countries (Sweden and Switzerland) are busily building air raid shelters and putting many new factories and power plants underground or in huge rock caves wherever they can. Nobody thinks that these countries want to start a war.

Mr. Philip W. Swain, an early and outstanding student of the atomic and nuclear bombs, declared during a lecture before the Metropolitan Section of the ASCE in May, 1954, that the bigger the bombs grow, the more shelters will be required, in order to save perhaps millions of lives.

The American people have a wonderful characteristic—resourcefulness. They do not expect everything from the Government but, if they recognize the necessity of something, they take action on their own initiative. This recognition is urgently needed today.

Shelters will cost money, no doubt about it. It is, however, worth every dollar we spend if we can buy with that dollar a reasonable amount of peace, calmness and self assurance.—***End.***

...NEW LITERATURE...

To help the offering firms determine which literature you require, when requesting an item, be sure to list all specifications shown . . . and say you saw it in the AMERICAN ENGINEER.

ROAD BUILDING MOVIE—Euclid Division of General Motors Corp. has just released a new 16 mm, 26 minute, color sound movie entitled "Ten Days Per Man." Illustrates the needs for public support of our better roads program and shows how modern methods and equipment can provide more roads at lowest cost. The film derives its title from the method of building roads in pioneer days when every able-bodied man was required to give 10 days labor on road construction. It encourages support of legislation for better roads in every part of the country. The film can be obtained by writing the Sales Promotion Dept., General Motors Corp., Cleveland 17, Ohio.

—AE—

COOLING TOWER PUMPS—A new Six Step Manual for sizing cooling tower pumps and piping was introduced recently by Bell & Gossett Co., Morton Grove, Ill. By means of six simple steps, it was explained, the most efficient and economical selection of cooling tower pumps and piping can be made. Also released was a newly revised Selection Chart and List Price Sheet CSP-155 on Series 1522 and 1531 Centrifugal Pumps. Both the Manual and new Selection Sheet are available free of charge upon request to the factory.

—AE—

JOINING STAINLESS STEELS—Crucible Steel Company of America has a newly-revised 24-page booklet: "The Joining of Crucible Rezistal Stainless Steels" describing in detail seventeen methods employed in joining stainless steel by fusion processes. Includes manual, automatic, and semi-automatic welding, brazing, and soldering. Also contains a section describing eight flame and arc cutting procedures commonly used for severing stainless steel. For a copy write the Advertising Dept., Crucible Steel Company of America, Box 88, Pittsburgh 30, Pennsylvania.

PACKAGED STEAM GENERATOR—Superior Combustion Industries, Inc., has issued a bulletin on the Type D Superior Steam Generator combining a completely packaged unit, the proven Type D tube arrangement, and the most advanced features for production of low cost steam. Designed for efficient, economical firing with gas, a variety of fuel oils, or both, the units are performance-rated for high availability and long life at capacities up to 40,000 lbs. per hour continuous steaming; and may be combined in batteries for any required total capacity. Outstanding design feature is the exclusive Superior rear-mounted forced draft fan which keeps the firing front clear for easy access and removes noise from the area of the operator. The plenum chamber between fan and wind box provides for installation of steam-air preheater if desired. Other features include tangent tube water-wall construction, single or multi-burners, optional soot blowers, adequate manhole and inspection openings, and a special patent-applied-for air shielded observation port. Request Bulletin 771-D from Superior Combustion Industries, Inc., 1475 Broadway, New York 36, N. Y.

—AE—

MOTOR BUYING—A new 28-page catalog, GEC-1026, of buying information on a-c motors is available from the General Electric Co., Schenectady 5, New York. Presents complete buying information on standard a-c fractional and integral horsepower motors in most general use. Included are general- and definite-purpose fractional horsepower motors, and fhp gear motors. Covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers, single-phase, poly-phase, totally enclosed fan cooled, and gear-type integral horsepower motors. Includes photos, ratings, book prices, dimensions, weights, frame members, and standard modifications.

ALUMINUM FORGINGS—Advantages of aluminum forgings are discussed in a new booklet published by the Technical and Development Department of Harvey Aluminum, Torrance, Calif. Completely illustrated, the 12-page text describes press forgings, impact extrusions, and hand forgings. Among the advantages of aluminum forgings that Harvey outlines are grain control, light weight, excellent finish, and ease of machining. Book enumerates the mechanical properties of aluminum forging alloys and summarizes typical forging applications. For "Aluminum Forgings" booklet write: Harvey Aluminum, 19200 S. Western Avenue, Torrance, Calif.

—AE—

CARBIDE METAL TOOLS—Allegheny Ludlum has issued the eighth edition of its Carmet Methods Manual detailing the superiority of cemented carbides for cutting tools. Covers grades, tool design, brazing, grinding, chip breakers, coolants. Gives hints on set-up, reference data, and cutting speeds in extremely informative cross-sectional drawings and tables. Write Allegheny Ludlum Steel Corporation, Pittsburgh 22, Pa.

—AE—

ALLOY STEELS—A new 200-page handbook, "Alloy Steels Pay Off" is offered by the Climax Molybdenum Company. Highlighted are the economic advantages of fabricating with alloy steels for improved weight-to-strength ratios in aircraft construction, bridges, electrical equipment, machinery, trucks and buses, etc.; longer life and less maintenance; heavier payloads and lower operating costs; improved safety and overall savings in freight and shipping costs. Advantages of high impact strength and shock load resistance are discussed—as well as savings resulting from improved resistance to corrosion and wear. Write: Climax Molybdenum Co., 500 Fifth Avenue, New York 36, N. Y.

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What's New

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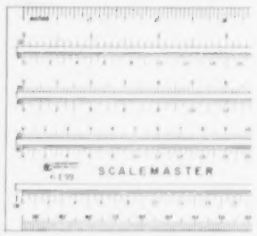

A new drawing aid for engineers is the new FLAT transparent plastic Engineering Scalemaster by the C-Thru Ruler Co. Has a flat scale, embodying many multiple scales, yet exposing all of them at one time. Offers time-saving advantages. Proper scale is always in full view. Convenient slotted apertures enable the user to scale a drawing with a minimum of trouble. Fabricated of dimensionally stable transparent plastic. Embodies 9 full divided scales.

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Morse's One-Coat Cement Floor Hardener penetrates deeply, and is said to permanently seal, harden, and dust-proof concrete and terrazzo floors—new and old. Treated floors take on a fine-etched surface that is non-porous and smooth but non-slip; highly resistant to wear and chipping, freezing and thawing, chemicals and compounds. Any pre-existent alkaline condition is neutralized, and the surface will not absorb water or dirt, oil or grease. Self-etched finish affords an excellent bond for the application of paint, wax or floor tile adhesive. Hardener is a clear liquid which requires no mixing, measuring, nor dilution.

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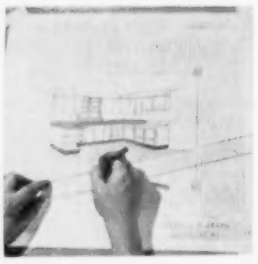

The Perspect-O-Graph, developed by Canlen Co., uses approved perspective computations giving all basic measurements for length, depth and height in any desired scale. Drawing guide is a clear plastic straightedge, marked to determine location of vanishing points automatically and used to draw receding lines direct to these vanishing points. Any view can be drawn quickly, easily and accurately on both tracing paper for blueprinting and opaque paper for inking, watercolor, etc.

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SILICONE TANNED SAFETY SHOES — *Item 4*

Leather safety shoes are now available from Record Industrial Co., which are treated in the tanning stage with Dow Corning "Sylflex". This treatment renders the shoes waterproof, yet allows the shoes to breathe. In addition to water, "sylflex" is said to stop chemical, oil, bleach, and caustic absorption. For all wet conditions, as found in chemical plants, oil refineries, pulp mills, construction work, etc. Have Neoprene soles and Dacron stitching for long wear under the most severe conditions. Silicone treated shoes are available in both oxford and high styles.

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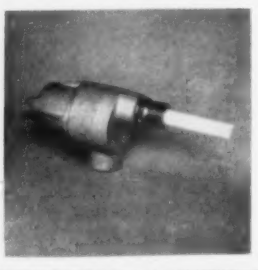
NEW LEVEL CONTROL AND ALARM — *Item 5*

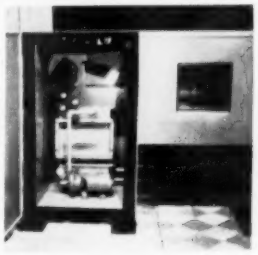


A new instrument designed by registered professional engineers is extremely versatile in its applications. With no moving parts the Prob-A-Larm Level Control can detect the level of liquids, grains, chunks or solids buildup at temperatures to 2000 degrees F or pressures to 15,000PSI. Available in weatherproof or explosion-proof cases. Probe insulated with teflon measures dielectric constant of area surrounding probe. Changes in level will cause changes in dielectric constant which is measured with bridge circuit.

This column describes new products of general interest to professional engineers. For further information, fill in the coupon provided and mail to the AMERICAN ENGINEER.

AIR CONDITIONED TEST CABINET — *Item 6*

Niagara Blower Co. announces a new completely air conditioned test cabinet to provide full control or relative humidity and temperature. Method used is that of saturating air at required dew-point temperature and reheating to desired dry-bulb temperature. Control of relative humidity to close tolerances is given in the range of 5% to 95%. No moisture-sensitive instruments are required; recording instruments may be used. Dimensions are 30" by 28" by 24" clear opening for access of 26" by 22". Window for viewing test material.



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AIR CONDITIONING PIPE INSULATION — *Item 7*

A new foamed plastic pipe insulation for use on dual temperature lines to air-conditioning units has been announced by the Armstrong Cork Co. Called Armaflex, it is available in tubular form. Can be slipped on pipes or tubing when the system is being installed, or, if the lines have been connected, Armaflex can be cut to desired length, slit longitudinally, snapped on, and the slit sealed with an adhesive available with the material. Has excellent insulating properties, thermal conductivity being .28 at 75°F., approximately that of corkboard. Withstands temperatures on dual-temperature lines or tubing from 32° to 200°F.

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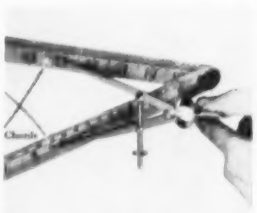
RULE SERVES AS PROTRACTOR — *Item 8*

A jointed stainless steel 2 ft. rule, which also serves as a protractor, has been introduced by George Scherr Co., Inc. Measures longitudinal as well as angular dimensions, avoiding difficulty of counting fine graduations. Has an accurate scale of chords engraved on one side from 0 to 120 advancing by half degrees. Two center dots, one on each blade, are for using a pair of ordinary dividers to set or determine any angle. Graduations read in 1/8", 1/16", 1/32", and 1/64".



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ROOF COATING REDUCES TEMPERATURES — *Item 9*

Siliconed Asbestolite, a new bright aluminum coating, which is reputed to protect and preserve roofs while reducing under-roof temperatures as much as 20 degrees, is announced by The Monroe Company, Inc. Basically composed of top quality asphalt, long strand Canadian asbestos and waterproofing oils, plus silicones and billions of bright metallic aluminum flakes to reflect the sun's rays. Claimed to turn back approximately 71% of the sun's heat, making possible employment of space previously too hot for practical use. For all industrial roofs, schools, hotels, institutions, etc. On farms, for chicken houses, silos, cornerib and barns.

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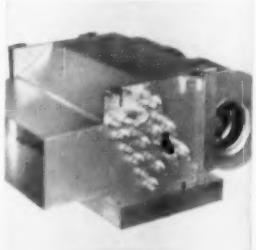
REMOTE AIR CONDITIONING UNIT — *Item 10*

The new 1955 International "Ceiling Hideaway" has a cabinet small enough to be installed above doors to closet or bath (only 11 inches high) and requires no additional duct work. All aluminum construction prevents oxidation and deterioration. Design permits motor and blower assembly to be lifted out and another installed in minutes. Each unit is individually controlled by a simple wall switch, yet operates from a central chilled water system.



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Dr. Robert N. Hall, of the General Electric Research Laboratory, is shown examining a rate-grown germanium crystal. He received both his B.S. (1942) and his Ph. D. (1948) degrees from the California Institute of Technology. Though trained as a nuclear physicist, most of Dr. Hall's research work has been done in the field of solid-state physics.

Growing semiconductors

General Electric's Dr. R. N. Hall conducts basic studies leading to new methods for the production of transistors

In 1948, Dr. Robert N. Hall began his work at the General Electric Research Laboratory with a study of the preparation of high-purity germanium crystals. As an outgrowth of this work, he found that indium and germanium could be fused to make alloyed *p-n* junctions—the basic elements of power rectifiers and most transistors.

Later studies showed how desirable impurities are segregated during the growth of germanium crystals. This led to the *rate-growing process* for making crystals containing large numbers of *p-n* junctions—now generally regarded as the most suitable process known for the mass production of grown-junction transistors for high-frequency use. Dr. Hall is currently engaged in research on modifications of the *rate-growing process* which will make possible the preparation of units for amplification at still higher frequencies.

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